# MINNESOTA MEDICINE

*Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association Northern Minnesota Medical Association and Minneapolis Surgical Society*

VOL. IX APRIL, 1926 No. 4

## URINARY ANTISEPSIS — THE CLINICAL APPLICATION OF EXPERIMENTAL DATA*

EDWIN DAVIS, M.D.
*Omaha*

Each of us is daily confronted with the problem of urinary antisepsis. This statement applies particularly to those of us doing urological work exclusively, but includes also each and every one engaged in general practice. Cases of urinary infection, characterized chiefly by frequent and painful urination, and by the presence of pus or bacteria, or both, in the freshly voided urine, are observed very frequently, in either sex, at any age. Those instances of urinary infection not frankly traumatic in origin, or due to faulty instrumentation, we are accustomed to explain on an hematogenous basis by reason of an associated extra-urinary focal infection or an acute infectious disease. We have been able to establish a fairly definite relationship between urinary infections and certain predisposing or accessory causes, chief among which are imperfect urinary drainage, stone, tumor, foreign body and trauma. Our knowledge, however, as to the exact etiology and mechanism of urinary infections remains rather meager. And when we come to a consideration of the treatment of these infections, we encounter a problem even more baffling. At the present time there is no known drug which may be given by mouth and which may be depended upon to prevent the growth and development of bacteria within the urinary tract. Yet there is reason to hope that such a drug may be discovered or synthesized. In fact, laboratory evidence accumulated during the past few years goes to show that there are at least three chemical compounds, each of which comes very close to fulfilling the requirements essential to the ideal internal urinary antiseptic.

*From the Department of Urology, University of Nebraska College of Medicine. Read before the Southern Minnesota Medical Association, Owatonna, Minn., May, 1925.

In the early experimental work upon this subject,[1] the ideal internal urinary antiseptic was defined as a chemically stable compound, comparatively non-toxic, and non-irritating to the lower urinary tract, which is eliminated, unchanged, by the kidney, and which exerts a definite antiseptic action in high dilution in urine of any reaction. The three compounds meeting these experimental requirements are chlor-mercury fluorescein,[2] acriflavine[3] and hexyl resorcinol.[4] There is laboratory evidence to the effect that either of these compounds administered to a normal individual will cause the secretion of urine which will kill the colon bacillus in a test tube. There is further evidence indicating that mercurochrome,[5] although eliminated by the kidney in relatively small percentage as compared with the other three, will also cause the secretion of antiseptic urine by the normal individual. Yet the clinical fitness of each of these four drugs awaits conclusive demonstration. In other words, there is a distinction between the fulfillment of ideal experimental requirements and practical clinical application. This is a disappointment, but a fact. For example, the urine of a normal individual, obtained following the administration of one of the above compounds, placed in a test-tube and inoculated with colon bacilli or staphylococci, will become sterile during incubation. Yet the same dose of the same drug, administered at frequent intervals over a period of weeks to an individual with chronic bacteriuria, is likely to have no appreciable effect upon the number of bacteria in the freshly voided urine, or upon the clinical symptoms. This indicates clearly that the test-tube experiment is not exactly duplicated within the living human urinary tract. As will be outlined below, there are other factors which enter in. We must therefore further modify our definition of the ideal internal urinary antiseptic. We must distinguish between the *experimental* and the *clinical* internal urinary antiseptic, and define the latter as that drug which not only possesses the above-listed theoretical requirements, but which also is of *distinct, proven clinical value.*

To attempt to conclusively prove the clinical value of a given "experimental" urinary antiseptic is to enter into a problem of far greater complexity than the original laboratory investigation proving the antiseptic properties and the "renal affinity" of that same drug. The treatment of each patient is an individual clinical experiment, which is necessarily lacking in the "control" which we are able to apply to laboratory experiments. Among the many confusing variable factors which enter into each clinical trial, probably the chief cause for inaccuracy in interpretation of results is the spontaneous or unexplained day-to-day variation, which is frequently observed in the pus and bacterial content of the urine of a given individual. That urine which is cloudy and infected to-day may be clear and sparkling to-morrow, for no known reason. Coincident with these variations in the urine we are accustomed to see alternating periods of exacerbation and spontaneous improvement in the clinical symptoms. In these cases there is therefore every opportunity for the *post hoc, ergo propter hoc* fallacy to enter in.

Inaccuracies in interpretation of clinical results also creep in through the improper selection of cases, and through failure to eliminate, by thorough investigation, the so-called accessory or predisposing causes of urinary infection. That a given case of uninvestigated pyuria or bacteriuria should either improve or fail to improve, following the administration of a given drug, is not evidence of particular value either for or against the efficiency of that drug. Numerous so-called accessory or predisposing causes of urinary infection must first be eliminated. There are certain well-defined and well recognized, "intra-urinary," predisposing factors, which may be grouped under the main headings, urinary retention, calculus, new growth and tuberculosis. The folly of attempting the cure by drug therapy of a urinary infection which is primarily dependent upon one of the above-named mechanical factors, is apparent.

Concerning the systemic or "extra-urinary" predisposing causes of urinary infection, our knowledge is relatively scant and unsatisfactory. There are those cases of pyuria or bacteriuria, occurring during the course of acute infectious diseases; and there is that large group of cases in which it is considered that chronic focal local infection plays a rôle. Whether our predisposing or underlying cause of infection be intra-urinary or systemic, to disregard this primary cause, and to attempt a cure by merely rendering the urine antiseptic, is obviously ridiculous. Therefore, if accurate information is to be obtained, the essential preliminaries in selecting cases suitable for internal urinary therapy are (a) complete general physical examination and (b) complete urological examination. It should be further noted that favorable results cannot be expected in far-advanced cases, as, for example, bilateral pyelonephritis, of long duration, with extensive destruction of renal tissue and lowering of renal function.

In view of the numerous obstacles in the way of obtaining accurate and reliable clinical data, it may therefore be stated that the clinical efficiency of a given "experimental" urinary antiseptic must be determined by the average opinion of a number of competent, unprejudiced observers, each of whom has accurately tabulated results in a series of cases sufficiently large to eliminate the *post hoc, propter hoc* fallacy. As yet no "internal urinary antiseptic" has stood this test.

We are not here primarily interested in a consideration of the value of the ordinary text-book "urinary antiseptics," among which may be mentioned hexamethylenamin, methylene blue, salol, oil of sandalwood, salicylic, boric and benzoic acids. Of these, hexamethylenamin is of some clinical value, but has its very definite and recognized limitations. Certainly, none of the others has solved the clinical problem of infected urine. It is the purpose of this paper to consider briefly the clinical limitations of, and the indications for, the four above-listed "experimental" urinary antiseptics, in order that we may know what facts of practical clinical value have been brought to us by laboratory work upon this subject. To repeat, these four compounds are (1) chlor-mercury fluorescein, (2) acriflavine, (3) mercurochrome, and (4) hexyl resorcinol.

*Chlor-mercury fluorescein.*—This compound was synthesized as long ago as 1918 by E. C. White at the Brady Urological Institute in the course of an investigation relative to the antiseptic properties and the renal excretion of compounds related to phenolsulphonephthalein (Davis, White and Rosen[2]). It was shown that this organic compound very nearly approaches the experimental ideal, in that the intravenous administration of a single minute dose (5 mgm.) to dogs or rabbits will cause the secretion of antiseptic urine for a definite period

of time (approximately 5 hours). In man, antiseptic urine was obtained following a single dose of 10 mgm. In these experiments the antiseptic value of the samples of urine obtained following drug administration was established beyond question by incubation following inoculation with colon bacilli and staphylococci, and by comparison with control samples of urine previously obtained and similarly treated. The appearance time of this drug in the urine after intravenous administration is even more rapid than that of phenolsulphonephthalein. Its toxicity has been carefully worked out with dogs and rabbits, the antisepsis-producing dose and the lethal dose (in dogs) having the ratio of one to forty. Chlor-mercury fluorescein, however, has never received a thorough clinical trial, chiefly by reason of the question of renal injury resulting from its mercury content, and partly because this investigation was interrupted by our entrance into the war. Recently, the widespread clinical use of large intravenous doses of mercurochrome without evidence of lasting ill effect, has afforded justification for undertaking a further clinical trial of chlor-mercury fluorescein. In this connection, attention should be directed to the rapid and abundant renal elimination of chlor-mercury fluorescein, in contrast with the very small fraction of mercurochrome which appears in the urine.

*Acriflavine.* — A continued investigation of the antiseptic properties and the renal excretion of compounds related to phenolsulphonephthalein, and of a large number of anilin dyes[6] (a total of more than 400 compounds), led to the discovery of remarkable properties possessed by acriflavine. This drug, in a dilution of 1-100,000 in alkaline (pH 7.4) urine, in a test tube, inhibits the development of the colon bacillus or the staphylococcus. Administered intravenously or orally, to animals or man, it rapidly appears in the urine, and is excreted in large volume. The (alkaline) urine of a normal man, obtained four hours after the oral administration of a minute dose (0.05 gram) of acriflavine, becomes sterile within eight hours after inoculation with colon bacilli. Since half of this dose (0.025 gram) has been administered daily to rabbits for a period of thirty days without ill effect, it is clear that acriflavine fulfils the experimental requirements and gives brilliant promise of clinical value. Subsequent clinical trial, however, has borne out this promise only in small measure, and has served to emphasize the distinction between the experimental and the clinical urinary antiseptic. A published report[7] of the clinical value of acriflavine administered orally to patients with urinary infections was summarized as follows:

1. A large proportion of the patients with acute urinary infections have shown a prompt improvement, characterized by a drop in temperature, a disappearance of bladder symptoms, a macroscopic clearing of the urine and a disappearance of bacteria from the urine. Relapses in these cases have been the exception.

2. Chronic urinary infections have not readily responded. Improvement was noted in only 60 per cent of cases, and in most of these the pus and bacteria reappeared in the urine after discontinuing the treatment.

3. Acriflavine administered orally to patients with acute anterior gonorrheal urethritis is not a dependable prophylactic for preventing the extension of the infection to the posterior urethra.

4. Acriflavine administered orally is of benefit in acute posterior gonorrheal urethritis in lessening the duration and the severity of the acute symptoms.

5. Mild catharsis or slight nausea was observed in approximately 30 per cent of the patients. This was due in part to the bicarbonate, since in some instances these symptoms preceded the dye administration. In 5 per cent of the patients vomiting and diarrhea were such as to contraindicate the use of the drug. No further ill effects have been noted.

6. The indiscriminate use of acriflavine by mouth, in unselected cases, and without regard to the elimination of the "accessory" causes of urinary infection, is distinctly inadvisable.

*Mercurochrome.*—This compound also was synthesized by White in the Brady Urological Institute in the course of the continuation of the investigations outlined above. Following the original publication by Young, White and Swartz,[5] describing its antiseptic properties, and recommending its use chiefly as a local instillation into the urethra and bladder, mercurochrome has rapidly come to be widely used as a local antiseptic in the various specialties. More recently there has developed a country-wide tendency toward the intravenous administration of mercurochrome in diverse varieties of sepsis. Unfortunately, this use of mercurochrome has not been limited to institutions where there has been opportunity for accurate observation and control, but has been by anybody, anywhere;

and will probably result in reflecting discredit upon the drug. On the other hand, the highly commendable investigations by Young and his co-workers at the Brady Urological Institute, including exhaustive and painstaking studies of a large series of case reports, collected from various observers and accurately tabulated without prejudice, leave no doubt in the minds of the ultra-conservative that in this drug, administered intravenously, we have a valuable therapeutic agent in selected cases of sepsis. In this paper, however, we are primarily interested in the control of urinary infections. Young[8] has also reported improvement in urinary infections following the intravenous administration of mercurochrome, for which there is some experimental basis in the work of Hill and Colston,[9] indicating a bacteriostatic action in the urine of normal rabbits following the intravenous administration of mercurochrome. Only a very small fraction, however, of mercurochrome given intravenously or by mouth appears in the urine, and for this reason mercurochrome would not seem to be as well adapted for the specific purpose of internal urinary antisepsis as is chlor-mercury fluorescein. Isolated instances of clinical improvement of urinary infections have been cited, following the internal use of mercurochrome, yet there has appeared no comprehensive clinical report, conclusively establishing the value of mercurochrome for this purpose.

In the form of a local application, however, mercurochrome is of established and proven value, and for this reason, if for no other, has made for itself a permanent place in our list of useful drugs. As applied in practical urology, mercurochrome is particularly useful as a local instillation into the posterior urethra, the bladder or the renal pelvis. There is a type of cystitis frequently observed in women, characterized by recurrent attacks of frequent urination, with urethral pain and burning, and by the presence of pus cells and colon bacilli in the urine. This clinical picture is frequently observed in general practice. It is in this type of infection that mercurochrome, in the form of daily instillations (10 c.c. of 0.5 per cent to 1 per cent) affords prompt and almost miraculous relief from symptoms. In this connection it should be noted that those cases failing to respond promptly to local treatment deserve complete urological investigation, in order to eliminate the so-called predisposing or accessory causes of chronic bladder symptoms, such as retained urine, stone, tumor, tuberculosis, or renal infection.

Mercurochrome is also a valuable drug in the treatment of chronic prostatitis, used as an instillation into the posterior urethra following massage. In this connection attention should be directed to the penetrating properties possessed by this drug.

*Hexyl resorcinol.*—Through the work of Leonord,[4] attention has recently been directed to hexyl resorcinol, synthesized by Treat B. Johnson of Yale. Leonard's experimental reports indicate remarkable properties for compounds of this series, in that as the number of carbon atoms in the alkyl side chain is increased there is a corresponding increase in antiseptic value (up to 6 carbon atoms, hexyl resorcinol), and at the same time a *decrease* in toxicity. Phenol coefficient determinations for hexyl resorcinol have averaged 46. Dissolved in either acid or alkaline urine, this compound has been shown to kill colon bacilli in a dilution of 1-10,000 and staphylococci in 1-50,000. Rabbits tolerate a daily dosage of 0.5 gram indefinitely. Leonard has shown that hexyl resorcinol, administered to normal rabbits, dogs and men, appears in the urine, and there exerts an antiseptic action, thus presenting a fourth compound possessing properties essential to the *experimental* internal urinary antiseptic. At the present time, sufficient clinical data have not accumulated to prove or disprove the clinical value of hexyl resorcinol.

## CONCLUSIONS

1. There is no known "cure-all" for infections of the urinary tract. In other words, the ideal internal urinary antiseptic, of proven clinical efficiency, does not exist.

2. Drugs with laboratory findings such as to indicate a theoretical clinical value, and which will cause the secretion of the antiseptic urine by normal human individuals, are:

(a) Chlor-mercury fluorescein, which has not as yet received a thorough clinical trial.

(b) Acriflavine, which is of distinct clinical value in acute urinary infections, but which gives results in chronic infections which are inconstant, and not permanent. Furthermore, chemically pure acriflavine is obtained with difficulty, and gastro-intestinal symptoms are not infrequent.

(c) Mercurochrome, which seems to have given good results in some cases, but which is

not dependable. Furthermore, there are severe reactions associated with the intravenous administration of mercurochrome. It is excreted in the urine only in small percentage. Mercurochrome is of definite and proven value in the form of local instillations into the bladder or posterior urethra.

(d) Hexyl resorcinol, which is of splendid experimental promise, but which awaits clinical confirmation.

3. Promiscuous medication with so-called urinary antiseptics without painstaking investigation to eliminate mechanical or systemic causes of infection is distinctly contraindicated.

4. The frequent observation of spontaneous and seemingly causeless exacerbations and remissions in urinary infections, with corresponding variations in the pus and bacterial content of the urine, should prevent hasty conclusions as to the clinical value of a given urinary antiseptic.

5. In this field of endeavor, there is cause for optimism rather than pessimism, for the reason that the one greatest obstacle has been surpassed. It has been conclusively demonstrated, and confirmed by different observers, that there are several chemical compounds which may be passed through the gastro-intestinal tract, the blood stream and the kidney of normal human individuals, rendering the urine an unfit culture medium for micro-organisms, and in no way injuring the body. It has further been shown that in selected cases one or another of these drugs may exert a curative effect upon inflammatory processes in the urinary tract. In this respect there has been a step of progress made.

REFERENCES


1. Davis, Edwin: Urinary antisepsis—A study of the antiseptic properties and the renal excretion of compounds related to phenolsulphonephthalein: Preliminary report. Jour. Am. Med. Assn., 1918, 70, 581.
2. Davis, Edwin; White, Edwin C., and Rosen, Robert: Urinary antisepsis—The secretion of antiseptic urine following the intravenous administration of an organomercury phthalein derivative. Jour. Urol., 1918, 2, 277.
3. Davis, Edwin, and Beck, Gerald H.: Urinary antisepsis—The secretion of antiseptic urine by man following the oral administration of proflavine and acriflavine: Preliminary report. Jour. Urol., 1921, 5, 215.
4. Leonard, Veader: Secretion of bactericidal urine and disinfection of the urinary tract—Following oral administration of certain alkyl derivatives of resorcinol. Jour. Am. Med. Assn., 1924, 83, 2005.
5. Young, H. H.; White, E. C., and Swartz, E. O.: A new germicide for use in the urinary tract: "Mercurochrome - 220": Preliminary report of experimental and clinical studies. Jour. Am. Med. Assn., 1919, 73, 1483.
6. Davis, Edwin: Urinary antisepsis—A study of the antiseptic properties and the renal excretion of 204 anilin dyes. Am. Jour. Med. Sc., 1921, 161, 251.
7. Davis, Edwin: Urinary antisepsis—Clinical results following the oral administration of acriflavine. Jour. Urol., 1924, 11, 29.
8. Young, H. H.: Urinary antiseptics. Jour. Urol., 1924, 11, 19.
9. Hill, J. H., and Colston, J. A. C.: A note on the bacteriostatic action of urine after the intravenous administration of mercurochrome to normal rabbits. Bull. Johns Hopkins Hosp., 1923, 34, 220.


## FOOD SELECTION FOR THE YOUNGER GENERATION

The time-worn question, "What shall we eat?" has been attacked from a new angle in a Government bulletin written for junior homemakers. Miscellaneous Circular 49, "A Guide to Good Meals for the Junior Homemaker," recently published by the United States Department of Agriculture, approaches a group not previously appealed to in the literature of nutrition.

The authors, Ruth Van Deman and Caroline L. Hunt, are specialists in the Bureau of Home Economics. They have presented the essential facts about foods in popular discussion. A novel introductory paragraph suggests that if all kinds of foods in the world were to be assembled in one market where people of all races came to buy, the combinations they chose would have similar food value though made up of very different foods. For instance, the Japanese might select fish, rice, certain legumes, soja sauce, bamboo sprouts, and persimmons, while the American chose meat, eggs, milk, bread, a variety of American fruits and vegetables, but each would have the makings of a well-balanced diet. The youthful readers are introduced to the term "calorie" in such a way that it can no longer hold any mystery for them. They are also advised to keep track of their weight, to drink at least a pint of milk a day, to include an abundance of vitamins and minerals (from the vegetable and fruit group), and to limit the quantity of sweets used.

The circular containing these valuable suggestions to homemakers of the future may be had while the supply lasts by writing to the United States Department of Agriculture, Washington, D. C.—U. S. Department of Agriculture.

# HEXYLRESORCINOL IN URINARY TRACT INFECTIONS IN WOMEN

H. M. N. WYNNE, M.D., F.A.C.S.
*Minneapolis*

Since the presentation of Leonard's report concerning his researches on urinary tract disinfectants there has been great interest in the clinical trial of hexylresorcinol. Estimates of its value by different men have varied. It is obvious that careful observation of a large number of patients over a considerable period of time will be necessary before the drug can be fairly evaluated by the profession. It is towards this end that I am recording a few cases in detail.

All of the cases reported are those of ambulatory patients selected from my private practice. The drug has not been used as the sole therapeutic agent; however, I believe that the detailed report will be of interest. Specimens for culture and smear were obtained by catheter, under aseptic conditions. The cultures were reported on by Dr. Floyd Grave and in no case were declared sterile until incubated at least seventy-two hours.

The drug used was furnished by Dr. Leonard in four preparations, namely: enteric coated capsules, enteric coated pills, a 25 per cent solution in olive oil contained in gelatin capsules, and 2.5 per cent solution in olive oil for administration to infants and children. In the more recent cases the drug was purchased in the market. Of the three preparations used for adults there is no doubt in my mind of the superiority of the one which is now on the market, namely, 25 per cent solution in olive oil contained in gelatin capsules.

All patients were directed to take the drug immediately after meals, and to increase the dose to the maximum slowly. In most cases one capsule three times a day after meals for three days was ordered and the amount gradually increased until the full dose of four capsules three times a day, after meals, was reached about the eighth or tenth day. In this way gastric and intestinal irritation is minimized. I have been surprised to find that some patients noticed more or less constipation after the first week or two.

In two of the patients, the urine showed albumin and casts before treatment, which continued to be present during the course. One of these had an acute exacerbation of cardio-renal symptoms which may possibly have been brought on by the use of the drug. A patient of this type should be under close observation during treatment.

## STREPTOCOCCUS INFECTIONS

*Case 1.*—Miss E. L. T. Age 41. White. Milliner.

*Diagnosis.*—Chronic urinary infection. Ureteral strictures, right.

*Duration.*—Six years.

This woman had been explored and no pathological condition found in the abdomen to explain her symptoms.

Bladder urine shows a few pus cells and streptococci in smears and in pure culture.

Right kidney urine contains no pus cells and no bacteria. Cultures sterile. Left kidney urine contains no pus cells and no bacteria. Cultures sterile.

*X*-ray shows no evidence of stone. Ureteropyelogram shows a narrowing of the ureter beginning 4 cm. below the ureteropelvic junction and extending downward 5 cm. and narrowing again below the pelvic brim. Wax bulbs repeatedly showed very definite resistance at both of these areas. On one occasion I was unable to get through the lower stricture and twice the bulb was stopped in the upper stricture. She also complained of two points of pressure which she localized over the stricture areas.

Differential 'phthalein.*

| | Left | Right |
|---|---|---|
| Appeared | 4 min. | 4 min. |
| Amount | 65 c.c. | 60 c.c. |
| Per cent | 11.2 | 11.2 |
| Concentration | 1 | 1 |

Streptococci were invariably found in smears and cultures from the bladder urine before treatment with hexylresorcinol, while the kidney urines were always sterile and no bacteria were found in smears.

*Treatment.*—From July 15 to September 27 she was treated with dilatation of the right ureter and instillation of silver nitrate solution into the kidney pelvis and three times a week bladder instillations of silver nitrate, silvol, or mercurochrome.

September 26, 1924. Hexylresorcinol (enteric coated capsules), gr. 5, t.i.d.,p.c. was begun.

September 27. After taking 25 grains, the urine showed a very large number of streptococci which were probably dead organisms, as the culture was sterile.

September 29. After taking 55 grains, the patient had to cease medication on account of nausea and intestinal cramps. Culture remains sterile and only four cocci were found in the smear.

September 30. Culture reported Gram positive diplococcus. Smears show a few cocci. Hexylresorcinol, gr. 5, t.i.d.,p.c.

October 1. Culture reported Gram positive diplococcus. No organisms found in smears.

October 2. Culture on agar sterile, in broth, contaminated. No organisms in smears.

*In each case in which the phenolsulphonephthalein functional test was performed, 1 c.c. of the dye was injected intravenously and the output from each kidney collected twenty minutes. Notation is made when the bladder was found to contain a specimen at the end of the twenty-minute period.

October 4. Discontinued hexylresorcinol.

November 15. Smears show no organisms.

December 2. Tonsillectomy. Shortly after tonsillectomy, her nocturia increased from once to three times. She voided twice as often during the day as before and had more burning than at any time since she had been under treatment. No organisms found in smears.

December 23. Very uncomfortable since last visit. Culture sterile and no organisms found in smears.

January 9, 1925. A few short chained streptococci found in smears.

January 22. Hexylresorcinol, 25 per cent solution in olive oil, 0.15 gm. t.i.d.,p.c.

January 24. Hexylresorcinol, 0.30 gm. t.i.d.,p.c.

January 26. Hexylresorcinol, 0.45 gm. t.i.d.,p.c. Complains of eructation of gas and a sour stomach.

January 28. Hexylresorcinol, 0.60 gm. t.i.d.,p.c.

February 2. Stopped taking hexylresorcinol.

February 19. Cultures and smears show no organisms.

February 21. Cultures and smears show no organisms.

February 23. Cultures and smears show no organisms.

November 23. Patient left the city after last visit, but writes that she still has her pressure symptoms over the strictured areas in the right ureter.

*Case 2.*—Mrs. M. T. B. Age 30. Housewife. White. Two children.

*Diagnosis.*—Acute urinary tract infection.

Urine from bladder cloudy, acid, no albumin, no sugar, no casts, some pus cells, no red blood cells. Streptococci in smears and in pure culture.

*X*-ray showed no evidence of stone.

When first seen, January 22, 1925, had had frequency and dysuria for one week. Two days later began having severe pains in both kidney regions, which continued with decreasing severity for one week.

*Treatment.* — January 29, 1925, began hexylresorcinol (25 per cent solution in olive oil), 0.15 gm. t.i.d.,p.c., gradually increased to 0.45 gm. t.i.d.,p.c., with no symptoms from the drug except that she thinks her breath is bad.

February 3. Patient took 0.60 gm. of hexylresorcinol a half hour after a breakfast of one cup of coffee and a slice of toast. Half an hour after taking the drug she had a severe pain beginning in the right kidney region, extending forward and spreading over the entire abdomen, accompanied by an intense desire but inability to defecate. These pains lasted about two hours.

February 12. Began hexylresorcinol again, having discontinued the drug on the 3rd.

February 16. Yesterday took no hexylresorcinol and today after breakfast of a cup of coffee and a half slice of toast took 0.45 gm. One hour later was seized with violent pains in the right back and abdomen which lasted about an hour, and for several hours after a slowly decreasing pain in the lower right quadrant, radiating into the vagina. Smears and cultures of the bladder urine show no bacteria. No blood.

November 2. Has been entirely free of urinary tract symptoms since last visit.

URINARY INFECTION DUE TO A GRAM NEGATIVE DIPLOCOCCUS (UNCLASSIFIED)

*Case 3.*—Mrs. W. F. J. Aged 52. Housewife. Never pregnant.

*Diagnosis.*—Acute urinary tract infection.

This patient was treated in the spring of 1925 for a chronic urinary tract infection of two years' duration. At this time a Gram positive coccus was repeatedly obtained from the bladder urine in pure culture and also in smears. Urine sterile on several occasions during summer and complete relief of symptoms.

October 7, 1924. Sudden onset of frequency, urgency, and dysuria.

October 9. Smears show a few Gram negative cocci, numerous pus cells, no red blood cells, no casts. Cultures on agar and broth remain sterile.

October 14. Smears show Gram negative cocci and a few pus cells. Cultures on blood agar and blood broth remain sterile. Hexylresorcinol, gr. 5 (enteric coated capsules), t.i.d.,p.c.

October 17. Smears show a large number of Gram negative cocci in clumps, few pus cells. Culture sterile. Hexylresorcinol, gr. 5, t.i.d.,p.c. Has had a slight looseness of the bowels but no cramps.

October 20. Smears show no organisms and no pus cells. Hexylresorcinol was continued for two days longer with no further symptoms of irritation.

November 4. Has had no further bladder symptoms.

MIXED INFECTIONS

*Case 4.*—Mrs. T. B. Age 83. White. Widow. Four children.

*Diagnosis.*—Chronic urinary infection.

Bladder urine very foul smelling, cloudy, alkaline, contains large amounts of pus, no red blood cells, very numerous long slim bacilli, some diplococci, no casts. Cultures show a long slender Gram negative bacillus and a Gram positive diplococcus.

*Treatment.*—All treatment except hexylresorcinol refused.

Hexylresorcinol, 0.15 gm. t.i.d.,p.c. for one week and increased to 0.30 gm. t.i.d.,p.c., which she took for about a week. This old lady did not return to the office, but wrote me that she had to stop the drug on account of severe constipation and loss of weight, and that she "could not eat more than a mouthful of food at a meal."

*Case 5.*—Mrs. E. M. S. Age 41. White. Housewife. Widow. Never pregnant.

*Diagnosis.*—Chronic urinary tract infection.

Had had attacks of bladder trouble off and on since 1916. At the onset of each attack had a little hematuria. Had an attack in January, 1924, following removal of tubes and left ovary for bilateral hydrosalpinx and pelvic adhesions. B. coli was isolated from the urine at this time. Cystoscopic examination June 9, 1924. Kidney pelves normal in size; ureteral orifices small. Bladder was normal except for very slight redness around right ureteral orifice. Urethra injected.

Urine specimens collected from bladder, right kidney and left kidney show no bacteria, no pus cells.

Differential 'phthalein (syringe cracked and some of the contents were lost).

| | Right | Left |
|---|---|---|
| Appeared | 6 min. | 6 min. |
| Amount | 12 c.c. | 6 c.c. |
| Concentration | 6 | 6 |
| Per cent | 15 | 7.5 |

The bladder at the end of twenty minutes' period contained 14 c.c. of urine with a concentration of 1 and percentage of 3.

December, 1924. Has had frequency and bladder discomfort constantly for over a year. Supravaginal hysterectomy and large cyst of right ovary removed. Later cauterization of cervical canal. Following operation, bladder symptoms became much worse. Cultures and smears made showed B. coli and considerable pus. Treatment with bladder instillations of silver nitrate three times a week.

January 16, 1925. Cultures and smears show a short chained streptococcus. No B. coli present.

January 22. Cultures and smears show pure culture of short chained streptococcus. Hexylresorcinol, 0.15 gm. t.i.d.,p.c.

January 24. Hexylresorcinol, 0.30 gm. t.i.d.,p.c. Has had slight constipation. Cultures in three tubes and smears all show short chained streptococcus.

January 29. Hexylresorcinol, 0.45 gm. t.i.d.,p.c. Streptococci in smears. Streptococci and a few Gram positive diplococci in culture.

February 10. Hexylresorcinol, 0.45 gm. t.i.d.,p.c. Smears show streptococci.

February 18. Culture and smears show streptococci.

March 4. Culture remains sterile and no organisms found in smears.

March 6. Culture remains sterile and no organisms found in smears.

The patient continued on hexylresorcinol for a week longer and afterwards was free from symptoms except for a few days in July, when she had slight burning and she again took hexylresorcinol for a week or two. There was no examination made at this time.

November 4. Smear shows no pus, no blood and no organisms. Culture shows a few colonies of a Gram positive micrococcus, much smaller than staphylococcus or streptococcus. The colonies appeared after forty-eight hours in the incubator and Dr. Graves thinks it is a contamination.

Has had no symptoms since the slight burning in July. The patient states that she feels better than she has for the last ten years.

B. COLI INFECTIONS

*Case 6.*—Mrs. W. F. M. Age 42. Housewife. White. No pregnancies.

*Diagnosis.*—Cystitis, chronic; urethritis, chronic; pyelitis, right, chronic.

Urinary tract symptoms for seven years. Two gynecological operations without relief and two resections of the bladder for ulcer with marked relief of dysuria.

Still has frequency (thirty to forty times in twenty-four hours) and urgency. Urine from the bladder shows trace of albumin, no sugar, acid, clear, no casts, few clumps of pus cells, no red blood cells, very numerous bacilli. B. coli in pure culture.

*Blood chemistry.*—Urea nitrogen, 13.99 mg. per 100 c.c.; creatinine, 1.88 mg. per 100 c.c.

Differential 'phthalein.

| | Right | Left |
|---|---|---|
| Appeared | 4 min. | 4 min. |
| Amount | 35 c.c. | 35 c.c. |
| Concentration | 1 | 1 |
| Per cent | 17 | 15 |

*Treatment.*—Patient refused cystoscopic treatment. Considerable relief from frequency by bladder and urethral instillations of silver nitrate. This patient was given hexylresorcinol on several occasions, but apparently could not take more than 0.15 gm. t.i.d.,p.c. without severe cramps and diarrhea. She did not seem to be able to establish a tolerance.

*Case 7.*—Baby L. Age 8 mo. Female. White.

*Diagnosis.*—Urinary tract infection. Duration about two months.

Bladder urine contains numerous pus cells and bacilli. Pure culture of B. coli.

*Treatment.*—Bladder irrigations and instillations of silver nitrate or mercurochrome, 0.25 per cent.

Hexylresorcinol, 0.025 gm. (2.5 per cent solution in olive oil) t.i.d.,p.c., increasing to 0.10 gm. t.i.d.,p.c. This was tried several times, but after two or three days the baby would vomit frequently. Vomiting ceased with discontinuance of the drug.

Rectal administration was unsuccessful.

*Case 8.*—Mrs. E. A. M. Age 64. Housewife. White. Four children.

*Diagnosis.*—Cystitis, chronic; hydronephrosis, chronic, right, infected; nephrolithiasis, right (stone in pelvis of kidney evidently causing partial obstruction). Probable duration many years.

Urine from bladder very cloudy, acid, 1.018, no sugar, trace albumin, a few hyaline casts, many pus cells, no red blood cells and very large numbers of bacilli. B. coli in pure culture.

Urine from right kidney similar to that from bladder. Urine from left kidney contains no bacteria in smear or culture and no pus.

*X*-ray shows an oval stone in a greatly enlarged pelvis of the right kidney at the ureteropelvic junction and clubbed calices.

The right pelvis held 60 c.c. without pain or leakage into the bladder.

Phenolsulphonphthalein test. One c.c., intramuscularly, appeared in seven minutes. Two hundred and eighty c.c. collected during the first hour read 35 per cent and 90 c.c. collected during the second hour read 20 per cent. Total 58 per cent.

Differential 'phthalein test.

| | Right | Left |
|---|---|---|
| Appeared | 9 min. | 6 min. |
| Amount | 38 c.c. | 60 c.c. |
| Concentration | 2 | 3 |
| Per cent | 6 | 13.5 |

Blood pressure varies from 175 to 190 systolic, 80 to 90 diastolic.

*Treatment.*—Pelvic lavage eight times, using large catheters. Bladder lavage and instillation of mercurochrome or silver nitrate three times a week. No improvement after two months.

January 23, 1925. Hexylresorcinol (25 per cent in olive oil), 0.15 gm. t.i.d.,p.c., increasing to 0.6 gm., and the full dose continued for one hundred days. The only symptoms from the drug were a little eructation of gas and slight nausea one day, mild constipation part of the time and diarrhea one day at the end of the third week. No increase

of albumin or casts and no red blood cells appeared at any time during the treatment.

July 30. Very little improvement in microscopic picture of urine.

*Case 9.*—Mrs. Q. Age 61. White. Social worker.

*Diagnosis.*—Chronic infection of bladder and right kidney pelvis of two years' duration.

Urine from bladder cloudy, sp. gr. 1.014, albumin none, sugar none, pus cells, no red blood cells, no casts. Pure culture of B. coli.

Urine from right kidney shows some pus cells, a few red blood cells (traumatic) and a pure culture of B. coli.

Urine from left kidney contains no pus cells, no bacteria. Culture remains sterile.

*X*-ray shows no evidence of stone in the urinary tract.

There was a slight obstruction to a No. 6 flute tipped catheter just above the right ureteral orifice.

Differential 'phthalein.

| | Right | Left |
|---|---|---|
| Appeared | 5 min. | 5 min. |
| Amount | 11 c.c. | 7.5 c.c. |
| Per cent | 12.5 | 17.5 |
| Concentration | 1 | 2 |

*Treatment.*—On catheterization of ureters, instillation of 1-1,000 silver nitrate solution in pelves of both kidneys and bladder.

March 17, 1925. Hexylresorcinol, 0.15 gm. t.i.d.,p.c., gradually increasing to 0.60 gm., but she dropped back to 0.45 gm., as she has "a strange feeling of exhilaration" when taking the full dose, but no other symptoms. Four hundred capsules in all taken.

November 10. Specimen obtained after cleansing meatus carefully and catching the stream in a clean vessel without contamination from the external genitalia. Patient would not permit catheterization. This specimen was examined very carefully and showed no pus cells and no bacteria either in fresh or stained smear.

The patient has not taken a dose of the drug for two months. She reports that she works sixteen hours a day and feels absolutely well. She now has no nocturia, no frequency and no dragging feeling.

*Case 10.*—Mrs. S. J. H. Age 60. Housewife. White. Widow. Two children.

*Diagnosis.* — Cystitis, chronic; pyelitis, left; nephritis, chronic, with hypertension. Duration six years. Large cystocele and prolapse of uterus.

Urine from bladder cloudy, acid, 1.013, trace of albumin, no sugar, some pus cells, no red blood cells, some hyalin and finely granular casts and bacilli. Pure culture of B. coli.

Urine from left kidney contains some pus cells, hyalin and finely granular casts and numerous bacilli. Pure culture of B. coli. Urine from right kidney contains no pus cells, no organisms, hyalin and finely granular casts. Culture sterile.

Differential 'phthalein.

| | Right | Left |
|---|---|---|
| Amount | 25 c.c. | 32 c.c. |
| Concentration | 22 | 15 |
| Per cent | 4.5 | .75 |

*X*-ray shows no evidence of stone in the urinary tract.

Pyelo-ureterogram, left. Slightly dilated pelvis, some clubbing of the calices and constriction of bases of calices.

*Treatment.* — Pelvic lavage at the time of cystoscopic examination. Bladder instillations of silver nitrate three times a week until April 20, 1925. A pessary was fitted which gave her great relief from symptoms of prolapse.

Hexylresorcinol, 0.15 gm. t.i.d.,p.c., gradually increasing to 0.60 gm. after ten days. This patient took two hundred gelatin capsules (0.15 gm. of hexylresorcinol, 25 per cent in olive oil) in all.

May 1, 1925, she began complaining of weakness, dizziness and an "all gone feeling." Examination by Dr. Woodward showed blood pressure 160–120, and a voided specimen of urine contained a large number of hyalin casts, cylindroids, mucus, and a few pus cells.

November 18. Patient reports that after she recovered from her attack in May she has had no bladder symptoms. She can now eat any of the foods such as pickles, acid fruits, etc., which aggravated her bladder symptoms before.

Urine from the bladder shows no organisms, no red blood cells, no pus cells, some hyalin and granular casts. Culture sterile.

## DISCUSSION OF CASES

*Case 1.*—This case of multiple strictures of the right ureter with streptococcus infection presents two very interesting features. Twenty-four hours after starting treatment with hexylresorcinol the urine was found to contain very large numbers of streptococci which were presumably dead, as the cultures remained sterile. Two months after disinfection of the urinary tract was complete, the tonsils were removed. This was followed by a urinary infection due, again, to a streptococcus which cleared up after about three weeks' treatment with hexylresorcinol. The patient still complains of discomfort which she refers to the strictured areas in the right ureter.

*Case 2.*—Acute urinary infection due to streptococcus. This patient experienced abdominal pains while taking the drug after very small amounts of food. The urine became sterile. Nine months later she had had no further trouble.

*Case 3.*—In this case, in which the infection was due to a Gram negative coccus, rapid relief of symptoms and sterilization of the urine followed a short course of hexylresorcinol.

*Case 4.*—An elderly woman, aged 83 years, could not take the drug. The symptoms which caused the patient to stop treatment were probably due entirely to constipation.

*Case 5.*—A chronic urinary tract infection by B. coli followed by the disappearance of this organism and the appearance of streptococci and a

Gram positive diplococcus. Disinfection of the urinary tract with complete symptomatic relief which appears to be permanent (8 months) followed a course of seven weeks' treatment with hexylresorcinol.

*Case 6.*—This patient could not establish a tolerance to hexylresorcinol even in small doses and treatment had to be given up.

*Case 7.*—An infant of eight months. The drug caused vomiting after two or three days and had to be given up.

*Case 8.*—A case of chronic B. coli infection with hydronephrosis and stone. A course of a one hundred days' treatment with full doses of hexylresorcinol resulted in very little improvement in the microscopic picture of the urine. Poor urinary drainage was a very unfavorable factor in this case.

*Case 9.*—A case of chronic cystitis and pyelitis, right, of two years duration, due to B. coli. Complete disinfection of the urinary tract followed a course of four hundred capsules of hexylresorcinol.

*Case 10.*—A case of chronic cystitis and pyelitis, left, due to B. coli. Complete disinfection of urinary tract followed a course of two hundred capsules of hexylresorcinol with bladder instillation of silver nitrate.

### COMMENT

For the reason that acute infections of the urinary tract frequently subside spontaneously it is dangerous to attribute a favorable result in this type of case to drug therapy. This is not true, however, of the chronic infections and especially those due to organisms of the B. coli group. Of the three chronic B. coli infections reported, in which treatment was continued for a reasonable period of time (cases 8, 9, and 10), one was not influenced. In both of the others, treatment was followed by complete symptomatic relief and sterilization of the urinary tract as shown by urine culture.

The coccal infections seem to be more susceptible to the drug than those due to the bacillary forms.

A few of my patients have complained of backache in the region of the kidneys from time to time. It seems probable that this was due to the disease rather than to the treatment. In one case only (Case 6) was there any suggestion of kidney irritation.

It is important to begin treatment with small doses, increasing them gradually. Gastro-intestinal irritation, which was a troublesome feature with the earlier forms of administration, is usually not severe and is of short duration with the olive oil preparations now on the market. The drug should always be administered immediately after meals. An occasional patient will not be able to establish a tolerance.

Some constipation was noticed by most of my patients after the first week or two of treatment.

The continued use of full doses over a considerable period of time is often necessary for a successful result. During treatment, the use of alkalies, especially sodium bicarbonate, should be avoided and the fluid intake should not be increased in order that a sufficient concentration of the drug in the urine may be obtained.

Alternating courses of hexylresorcinol and other urinary antiseptics has seemed to be unsuccessful.

The clinical evidence reported supports the claim that hexylresorcinol exerts a distinct antiseptic action in the urine of patients suffering from urinary tract infections whether due to coccal or bacillary infections. This action is apparently sufficient to completely disinfect the urinary tract in some cases.

### REFERENCES

Leonard: Jour. Am. Med. Assn., lxxxiii, 2005, Dec., 1924.
Leonard: Jour. Urol., xii, 585, Dec., 1924.
Henline: Jour. Urol., xiv, 119, Aug., 1925.
Braasch: Minn. Med., viii, 313, May, 1925.

## OTHER STATES BUILD MORE

So far as the buildings which have been erected at the expense of the state are concerned, it should be said that while Minnesota has been liberal in this respect, a number of our neighboring states have appropriated much larger sums for buildings over shorter periods of time than has Minnesota. The state of Michigan appropriated to the University of Michigan more than $8,000,000 for buildings during the last four years. The state of Iowa has appropriated in the neighborhood of $4,000,000 for buildings for the University during the last four years. The amount appropriated by the state of Illinois for buildings at the University of Illinois during the last biennium was $2,500,000. A similar request is being made for the next biennium. Ohio has a building program of $8,000,000 to be submitted at this next legislature. The program at Minnesota, if it continues to develop as it is now developing, will not be a burden upon the state at any time. We should be able to build in accordance with our actual needs, and to have ample time to study our problems. There will be no extravagances or lavish expenditures. Progress will be made wisely and intelligently. The Legislature is to be commended for having adopted this plan.—President L. D. Coffman, *Minnesota Chats*, Feb., 1926.

# UROLOGY IN SURGICAL DIFFERENTIAL DIAGNOSIS*

A. E. SOHMER, M.D., F.A.C.S.
*Mankato, Minnesota*

The technic of surgical operations has developed to a remarkable degree in the last two decades. Hand in hand with the advance of surgical technic, and its extended field of safe therapeutic procedure, has come a greater knowledge of living pathology, brought about by the opportunity offered surgeons to observe and classify diseases in their actual progress, as well as the positive proof of their location and extent, permissible by actual observation of the exposed tissues and organs.

A further advance which is the object of the present endeavors of research workers, and which is put into useful application by the surgeon in his daily work, is the study and employment of biological factors in physiology and pathology; so that today the science of structural changes is augmented by that of functional capacity, in that the body as a whole, rather than the local organ of attack, is the criterion of properly timed and distributed therapeutics.

Let us speak of surgery in a larger sense than the work of the individual operator who merely does the mechanical work of cutting, sewing, removing, anastomosing or draining. As Dr. Wm. J. Mayo so aptly puts it, "the surgeon is a therapeutic measure, like a dose of digitalis, prescribed and planned for by his associates—the internist, pathologist and bacteriologist, and the specialist in other lines." Many times the surgeon must possess and apply the working knowledge of any or all of these.

Not only has surgery been the means of advanced therapeutic measures, but it has opened the door to better structural and functional diagnosis; the opportunity has been given to the internist, bacteriologist, pathologist and specialists in other fields to co-operate in the better understanding of the etiology, location, extent, progress, climax and end-results of many hitherto obscure lesions, which were as a hidden book, or understood only in an empirical way.

Just as the accumulated knowledge of the various specialties has made for a better handling of the problems at hand, so modern surgery demands a broader knowledge of the surgeon in the specialties, in order to make a better and more exact diagnosis, and consequently to allow him to do a more purposeful operation. It takes training in technic only, to make a good operator, but it requires a deep and broad knowledge of health and disease to make a good surgeon. Diagnosis, preparation for operation, good technic and persistent after-care and follow-up form the path which must be followed in the field of good surgery today.

In the large clinic, or where good co-operation between surgeon, physician and the various specialists is at hand, diagnosis is more easily made. The surgeon who pursues his daily work under average conditions must himself have a working knowledge in special fields to become satisfactorily proficient; just as the internist must use and interpret the ophthalmoscope, electrocardiogram and *x*-ray, so the surgeon today must possess knowledge in the special fields. To do good goiter work he should know the physiology and pathology, as well as the anatomy of the thyroid and associated organs; he must know the interpretation of the rate of metabolism, the type and stage of the disease, and the indications for drug therapy, *x*-ray, rest cure, dietetics, and operation, as well as the type and extent of operation.

Chronic liver infections in which surgery is indicated should have careful preparatory study and treatment, with reference to liver function, bile infection, blood coagulation, and functional activity of the cardio-renal system, before operation is done. The diabetic who formerly was a bad surgical risk can be put on a safe basis for surgical attack by checking and adjusting the sugar and acid balance in the blood with diet, insulin and alkalies, grading the dosage with the help of the laboratory, and according to the individual response; thus a diabetic is as safe as another patient for surgical work.

A patient with acidosis or ketosis, due to severe surgical infection in the non-diabetic, may likewise be carried over to safe operation and recovery by the timely use of glucose, soda and insulin, under laboratory and clinical control.

Taking for granted the need of proper and exact surgical technic, it is equally or perhaps more important to acquire the personal training, or to associate ourselves with our colleagues in the other specialties in the making of exact organic and functional diagnosis. The present field of development

*Presented before the Interstate Post-graduate Assembly on its clinic tour on board the S. S. Doric, May, 1925.

in biology, physiologic, as well as pathologic, will lead us into better diagnosis, and tell us where and when to operate; it emphasizes more than ever before the great importance of patient and careful preparatory, as well as scientific after-treatment, putting these on a par with mere surgical technic.

This broader view of surgery is in contrast to the regrettably large class of operative work, which begins with the physician who for a fee or commission refers his cases to an operator, who, accepting a snap diagnosis, or one made with poor facilities and limited means of observation, accedes to demand for immediate operation; for fear of losing the case a hurried, incomplete or misplaced operation is done. This is "operating," but not the work of a true surgeon.

Urology as a specialty has been developed in the last decade or two to an enviable position in science. Many illustrious names are interwoven in the story of the development of the diagnostic and operative instruments used in this work; the laboratory has given us great help with blood chemistry and functional tests of the urine; the *x*-ray specialist is doing marvelous team-work along these lines. The surgeon, who is on the firing line, has at his command this wonderful array of diagnostic equipment to bear on his work.

In the conditions that the surgeon is called upon to treat, it is often necessary to differentiate urologic findings. Many an appendix has been removed when the real cause of the trouble is a calculus lurking in the ureter. Useful and harmless female generative organs have been sacrificed before a ureteral kink or stricture was discovered and remedied. Because of relatively obscure symptoms or reflected signs, and the occasional difficulties attendant upon diagnostic technic, the simpler and more common operations might be hastily done, while the real and more obscure cause is overlooked. Needless pain and expense and the loss of time are offered up on the altar of ignorance and haste, and life is endangered when a vital member of the urologic system is strained by the anesthetic, or the operative shock of an unhappily chosen time or field of attack.

With these preliminary remarks, I wish to show a small series of illustrative cases as they occur in the practice of the general surgeon. They show the importance of urologic consideration in the field of surgical diagnosis. These cases were referred with other diagnosis than the true one or primarily appeared to be something else.

*Case 1.*—Mrs. L. J. M. Age 29, married. Referred with right abdominal pain, suspected of having appendicitis. Among other things, history evolved nocturia, with no day frequency, right lumbo-inguinal pain, radiating to external urethra. Some pain all the time, with paroxysms of acute pain. Cystoscopy showed a mild general cystitis and a swollen right ureteral opening. Catheterization showed six pus cells per field in the uncentrifuged specimen. Kidney lavage with internal medication brought about a prompt recovery.

This case illustrates the type of pyelitis which we often find and which may be mistaken for disease of other abdominal organs.

*Case 2.*—C. M. McN. Age 56. Comes with symptoms of urethral stricture and irritable bladder. There is a cystitis present, with pus and red blood cells. He has a stricture of the meatus, with a slight hypospadias. Meatotomy under local anesthesia allowed the passage of steel sounds to and including F26 with little discomfort. Cystoscopy showed a moderate cystitis, with moderate sized diverticulum. This was corroborated by cystogram. One can note the indentation produced by a moderately enlarged prostate, with several opaque shadows. Irrigation of the bladder caused improvement, with practically normal function.

This case illustrates the fact that all bladder obstructions are not due to the prostate, and that we also find a tight meatus responsible for obstruction, bladder irritability and even kidney infection.

*Case 3.*—Mr. F. C. Age 59. Comes because of nocturnal incontinency and a frequency of eight to ten times a day. Febrile attacks with chills ten days previously, with abdominal soreness. A history of bladder disturbance for ten years, with incontinence within the last year. Per rectum one can feel an enlarged, soft prostate. Blood pressure 185/110; pyorrhea. The urine shows 4 plus pus cells, clumped, specific gravity 1,020; otherwise o. k. Blood creatinin 2.55; non-protein nitrogen 52; urea nitrogen 24.2; Kollmer negative. Cystoscopy shows a mild general cystitis, a moderate trabeculation, shallow diverticulum present in both ureter regions and a large wide diverticulum in the apex. The right ureter was obstructed 1 cm. from the os. The cystogram shows irregular walled bladder with multiple diverticuli, with long narrow tongue of bladder, extending upward and forward in the region of the apex. Diagnosis: Hypertrophied prostate (causing obstruction), diverticuli, cystitis, poor kidney function. Drainage with retained catheter for several days was used; then a suprapubic cystostomy was done, keeping the elbow tube plugged and decompressing slowly over a period of several days. However, the kidney condition, and the patient's general condition did not improve, and patient gradually succumbed with uremia; in spite of the routine treatment with glucose and soda per rectum acidosis developed and death ensued three weeks after he first came under observation. He never reachd the stage of prostatectomy, and the decompression that was used was only sufficient for the patient's

physical comfort. A few days after decompression, his creatinin was 2.9, urea nitrogen 88.9, p.s.p. function less than 5 per cent in two hours. (See Fig. 1.)

**This case illustrates the importance of observing the physiological function of the patient. Operation was contraindicated and not done for that reason.**

*Case 4.*—Mr. J. K. Age 65. Referred because of bladder irritation, with retention. Gives a history of having had swelling in the region of the right kidney fifteen years before, which after a week drained into the bladder with discharge of pus and blood. While generally well, he has had more or less irritation since then. Cystoscopy showed narrow urethral meatus, requiring dilatation to pass a F24 cysto urethroscope. Bladder contains shreds of mucus. Sphincter margin is irregular, edematous inflammation extending throughout the whole deep urethra. Ureter orifices are enormously dilated. Urine contains 4 plus clumped pus cells and few red cells. Kidney outlines on *x*-ray showed no calculi but some enlargement of the left kidney. A cystogram made in the right and left oblique position turned out to be a beautiful cysto uretero-pyelogram. The 20 per cent sodium bromide solution injected into the bladder entered both ureters and the renal pelves. Both ureters markedly tortuous and dilated. When he lay in the left oblique position, the left ureter filled. and lying in the right oblique position, right ureter filled. Two days later, under cystoscopy, one could see a very interesting picture. The bladder, because of previous lavage, was clearer; both ureter orifices appeared to be very large, so that the cystoscope could be thrust into the orifice. The current of urine containing mucus would be drawn up and down into and out of the ureter with respiration, creating a distinct current to and fro, just as if a suction syringe were attached to the upper end of the ureter, pulling in the current, followed by the expulsion of the current. In other words, the kidney pelvis, ureter and bladder were one large cavity, with no physiological sphincter or other control. Generally, the patient had a blood pressure of 110/60, with 101.5° fever. His blood creatinin was 3.1; non-protein nitrogen 168 and urea nitrogen 78. Nothing was done but bladder and ureter lavage and general treatment. The patient succumbed to uremia, with diagnosis of chronic bilateral hydronephrosis, with failure of kidney function, and bladder retention. No doubt for fifteen years this condition has been coming on, until the function of the kidneys was so low that the patient could not recuperate.

Fig. 1. Case 3. Small diverticula of bladder and elongated bladder extending towards apex, simulating diverticulum. Oblique view.

**This is another case illustrating the importance of observing kidney function and avoiding operation if it does not reach a safe margin.**

*Case 5.*—Mrs. O. S. Age 40, married. Referred with history of having been treated for gallstone colic for over a year, and then referred because of suspected kidney colic. This patient had an alkaline urine, with pus cells 4, hemoglobin 78 per cent, w.b.c. 9,300. *X*-ray showed a calcified area in the region of the bladder, 3x6.5 cm., apparently vesical calculus, and suspicious shadows in the kidneys. Cystoscopy showed the bladder wall to be covered with encrustations, and large stone as big as a hen's egg, 6x3 cm. The urine was foul and ammoniacal. Because of the condition of the bladder and the size of the stone, suprapubic cystotomy was done, and the stone removed. The encrustations were scooped off the whole bladder wall, drainage instituted, the patient put on hexamethylen, with large doses of acid sodium phosphate, as well as the inorganic acids internally, and the bladder lavaged. The reaction could not be changed, however, until the patient's diet was so arranged as to give her only acid-producing foods, including meats, eggs, oatmeal, and eliminating alkaline-producing foods, giving her large quantities of water—a glassful every hour. Then the urine became acid and the bladder condition improved. Patient was sent home and returned at intervals for kidney lavage through the cystoscope, so that nine months later the urine was acid, and there was no sign, by *x*-ray, of stone in the bladder or either kidney. In other words, a bad infection of both kidneys

Fig. 2. Case 5. Large bladder stone.

and bladder, with alkaline concretions and stone formation, through kidney lavage, bladder drainage, ingestion of large quantities of water, acid-producing diet, completely eliminated stones without kidney operation. Had the nuclei been more resistant and had the stones not been of the soft, phosphatic type, this could not have been done. (See Fig. 2.)

Fig. 3. Case 6. Very large biliary stone. Stone in right lower ureter.

*Case 6.*—J. H. Q. Age 60. Comes because of a number of severe attacks of pain in right side, shooting towards bladder. Lately quite marked. The interesting thing about this case is, first, the *x*-ray findings showed both kidneys clearly outlined, and of normal size and position. A large circular shadow 6.5 cm. in diameter with calcium deposit on edges in region of gallbladder. A small shadow 8 mm. long in region of right uretero-vesical junction. A re-ray with ureter catheter in position, shows the catheter in contact with calculus at the ureteral opening, with obstruction. The cystoscopy shows a swollen ureteral mouth, with obstruction to the catheter. (See Fig. 3.)

**In this case the large gallbladder stone did not cause the symptoms, but the small calculus impacted in the lower ureter; this was treated conservatively through the cystoscope.**

*Case 7.*—F. E. P. Age 52, married. Referred for operation because of recurrent appendicitis, having had four colic attacks the previous week. Has had no illness, except hemorrhoids operated five years ago, and causing no trouble at present. The urine showed some pus and a few red blood cells. The description of the attack made one suspicious of the urinary tract. X-ray showed the right kidney enlarged; the left kidney normal. A suspicious shadow, 4x7 mm. in size, in the region of the right uretero-vesical junction. This was also treated conservatively through the cystoscope, with dilatation by means of several catheters. (See Fig. 4.)

*Case 8.*—T. N. Age 26. History of typhoid nine years before. Because of several cases of ruptured appendix in the family, the patient became alarmed, thinking he might have appendicitis. Urine showed pus cells 2 plus. *X*-ray showed a small suspicious shadow, lying just above the region of the right uretero-vesical junction, 3x8 mm. in size. Through the cystoscope, a catheter was placed in the ureter, and showed the same shadow, approximately 2 cm. high, in contact with catheter.

Dilatation of the ureter caused this stone to pass several days later.

*Case 9.*—B. E. Age 36. Referred for probable appendicitis. Examination showed a leukocyte count of 20,300. The urine showed only occasional pus cells, but was otherwise negative. However, the nature of the pain and the tenderness, which was more marked in the left kidney region, with some tenderness along the right ureter, made one suspicious of kidney involvement, and the case was studied further. *X*-ray showed both kidneys normal size and position. On right side, apparently in course of ureter, at level of transverse process of fourth lumbar vertebra, is seen an opaque shadow about 1 cm. in diameter. Somewhat irregular density. At this time no stone was observed in the left side. Tenderness was more marked in the left kidney. The urine still showed but few pus cells and an occasional red blood cell. The catheterized urine gave a growth of pure culture of staphylococcus. Cystoscopy showed a general cystitis, with the right ureter obstructed six inches from the meatus; left one four inches from the meatus. Further study showed that a stone also existed on the left side.

In other words, this patient had a chronic pyelitis, with stone impacted in each ureter. Repeated catheterization

Fig. 4. Case 7. Stone impacted in right lower ureter.

and dilatation of the ureters, done over a period of two months, did not cause the stone on the right side to move at all, and the one on the left side merely moved up and down, and because of the danger of complete obstruction, it was decided to remove these stones by open operation; through an incision along the right rectus border, the right stone was removed extraperitoneally. It was impacted in the ureter, so that it had to be pried out, even after it was exposed. Then the appendix was removed, which showed chronic disease. Eleven days later a left extraperitoneal

ureterotomy was done, and the left stone removed. There was a decided stricture below the stone. Patient made a prompt and good recovery. (See Fig. 5.)

*Case 10.*—W. J. Age 25, single. Referred with a history of left renal colic. At home physician took an *x*-ray which showed shadow suspicious of calculus in the left kidney pelvis, and wanted a left pyelotomy done for the removal of the stone. A re-ray a few days later showed no stone in the left kidney, but a stone that was in the left lower ureter. There was complete blocking of this ureter, with intense pain because of back pressure. Two catheters were put in the ureter past the stone and left in for twenty-four hours. This was repeated several times during several weeks following, and the patient passed the stone spontaneously. (See Fig. 6.)

This case illustrates the importance of rechecking all cases immediately before operation, because these stones move, and a pyelotomy would have been futile with a stone that was impacted in the lower ureter.

*Case 11.*—Mrs. W. B. J. Age 31, married. Comes because of pelvic condition. Pelvic backache more on right side, radiating to right inguinal region, with nausea and sometimes vomiting. Burning sensation with spells of urine frequency. Six weeks ago attack simulating appendicitis.

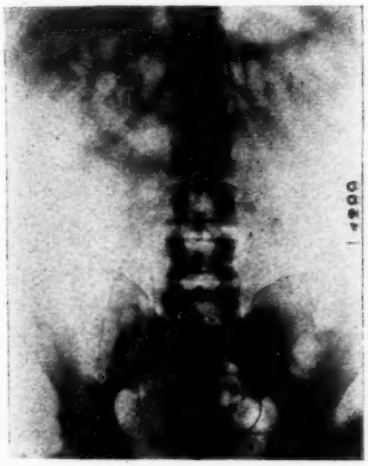

Fig. 5. Case 9. Stone in each ureter.

She had a moderate perineal relaxation; cervix showed chronic ulceration with considerable leukorrhea. The right adnexa and appendix were very tender; the right kidney was palpable. Profuse menstruation. Operation was advised, and a month later the endocervix was excised, a plastic done on cervix and perineum, resection of cystic right ovary was done, left salpingo-oöphorectomy, Crossen-Gilliam shortening of uterine round ligaments, and appendectomy. The day before leaving the hospital, ten days later, she had a colic, suspicious of renal colic, so that an *x*-ray was taken, which showed a small calculus about 1 cm. in size lying in the bladder. This was passed shortly after.

In this patient there was definite disease of the genital organs, and in addition a calculus existed in the right ureter.

Fig. 6. Case 10. Stone in lower ureter. Contrast fluid in bladder neck.

*Case 12.*—E. M. Age 17, single. Comes with pain in the abdominal inguinal region, suspicious of appendicitis. Urine shows occasional pus and red blood cells. *X*-ray shows kidneys normal in size and position, and irregular calcified area 2x10 mm. in diameter, lying in the lower right ureter.

Dilatation of the ureter with catheters caused this stone to be passed spontaneously, illustrating the type of case that simulates appendicitis, but in reality is due to kidney stone.

*Case 13.*—H. R. Age 35. Has repeated attacks of abdominal pain simulating appendicitis. He has dental abscesses. An *x*-ray showed a small circular density about 7 mm. in diameter lying just above level of right ureterovesical junction. Cystoscopy and repeated dilatation with catheters did not allow the stone to pass, so that it was removed by open operation, doing an extraperitoneal ureterotomy.

*Case 14.*—Mrs. W. M. Age 62, married. Referred because of acute abdominal pain in right inguinal region. Appendicitis suspected. The urine shows some pus cells and a few red blood cells; leukocyte count 13,000. Tenderness on kidney percussion. From the type of symptoms, calculus is suspected. An *x*-ray, after careful routine preparation, shows no sign of calcification, in spite of symptoms. The patient improved under a mild urinary antiseptic and the drinking of plenty of water. She had several attacks of similar pain during the following six months, when she spontaneously passed several uric acid stones. These were checked up under the fluoroscope, and cast absolutely no shadow.

**In this case the clinical history and urinary findings pointed to calculus in spite of negative *x*-ray findings.**

*Case 15.*—Miss M. D. Age 25. Comes with symptoms of abdominal pain simulating kidney colic, which continued in spite of an appendectomy done several years before. Cystoscopy and pyelogram showed kidneys normal in size and position, no calcification in urinary tract. The right ureter, at the level of the fifth lumbar vertebra, is drawn almost to median line and anteriorly, producing a kink; at this point the ureter catheter was obstructed.

Fig. 7. Case 16. Kink in each ureter.

**In this case we had pelvic adhesions, pulling the peritoneum with its attached ureter to the mid-line, causing a kink. Laparotomy to release adhesions cured this patient.**

*Case 16.*—E. M. Age 30, single. Gives a history of abdominal operations for appendicitis, peritoneal adhesions, retroverted uterus and more adhesions, done at various times, and yet she has spells of typical Dietl's crisis; and pyelogram shows both kidneys ptosed. Lower pole of right kidney opposite fourth lumbar interspace; left opposite third. Right kidney pelvis and calyces normally filled; slight kink at junction of kidney pelvis and ureter; right angled turn of ureter at pelvic junction. The left kidney pelvis normally filled; definite kink at junction of ureter and kidney pelvis. This ray was taken with the head of the table lowered. This patient had an occasional colic on the right side, but they were most frequent and more marked on the left side. (See Fig. 7.)

**Illustrates a typical case of Dietl's crisis, due to kinked ureter.**

*Case 17.*—Miss L. A. C. Age 29. Has pain in back, radiating down right leg, of sudden onset. Has had several spells of this kind since she was in an automobile accident two years before. She was operated in another city three weeks ago, where a right cystic ovary and the right tube were removed; her appendix had been removed several years before. These symptoms were suspicious of kidney colic, and a pyelogram made at this time showed the left kidney and ureter negative. Right kidney ptosed; shows an acute V-shaped kink of ureter one inch below its junction with renal pelvis, the apex of kink pointing outward and slightly backward; slight dilatation of ureter; catheter meets a stricture lower down the ureter. (See Fig. 8.)

**Under diet and treatment with abdominal supporter, this patient improved and had no further colic; moderate discomfort after physical exertion.**

*Case 18.*—Mrs. E. F. L. Age 28. Symptoms of cystitis, which did not improve under treatment, and spells of sharper pain over course of several years. Examination showed a tender left kidney; no urethral caruncle; moderate stricture. Cystoscopy shows bladder o. k., left ureter mouth markedly swollen and red; the catheter was passed easily into the kidney. Pyelogram of left kidney normal size and position; kinking of left ureter at level of transverse process of fourth lumbar vertebra; another less marked kink 7 cm. below this. A catheter was introduced into this ureter, and left in situ for several days.

**This was more than two years ago. The patient has remained well since then.**

*Case 19.*—W. Q. Age 34. Comes because of symptoms of abdominal pain. Appendectomy done one and one-half years before. There is some dyspnea; few pus cells and red blood cells in the bladder; *x*-ray shows nothing abnormal. Cystoscopy showed a stricture of the meatus, bladder negative, the right ureter o. k., left ureter mouth appears shallow and relaxed, with stricture at intramural terminal portion, not admitting an F6, but an F5 with difficulty; this was again arrested four inches further. The urine obtained showed pus. A pyelo-ureterogram showed the right ureter and kidney o. k., left ureteral catheter could be introduced only two inches, ureter displaced slightly laterally; no stone. Diagnosis: Stricture of the left ureter.

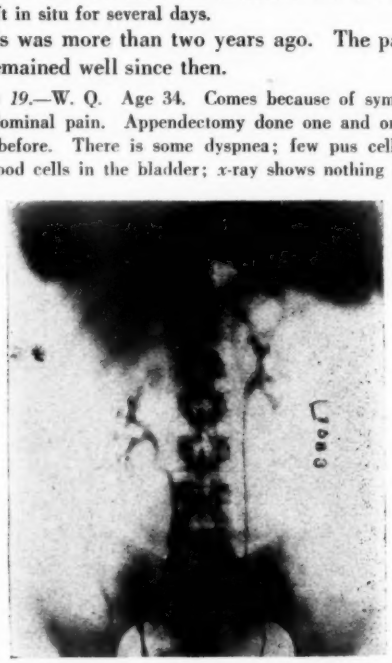

Fig. 8. Case 17. Kink in right upper ureter.

**Under several dilatations and kidney lavage this patient fully recovered.**

*Case 20.*—Mrs. C. I. Age 44. Patient has spells simulating kidney colic. Fifteen years ago was operated for retro-displacement of the uterus. Thirteen years ago a left nephropexy was done; a year ago the left kidney was removed. She still has symptoms referable to the right kidney. Cystoscopy and ureteral catheterization shows an obstruction or stricture in the right lower ureter, with mild pyelitis and dilatation of the kidney pelvis. Pyelogram of the left ureter filled up to the region of the kidney pelvis, the kidney having been previously removed. The right ureter showed a definite dilatation about 1.5 cm., at level of the transverse process of fifth lumbar vertebra, extending upward for 5 or 6 cm., with poorly filled kidney pelvis. Repeated dilatation of the stricture with kidney lavage improved this condition.

**The patient states that she did not know what the pathology of the removed kidney was.**

*Case 21.*—T. W. McM. Age 61. Five months ago appendectomy. Comes now because of pain in right inguinal abdominal region, radiating down to thigh, and backache. Epididymis on the right side was removed five months ago; thought to be tuberculous; postoperative pneumonia; was catheterized—developed cystitis with pyuria; spells of irritable bladder. Urine now has 4 plus pus and some red blood cells. Cystoscopy shows a moderate enlargement of lateral lobes of prostate, mild general cystitis, no ulcerations; right ureter shows a stricture, does not admit even a whalebone filiform; left shows a slight stricture but F5

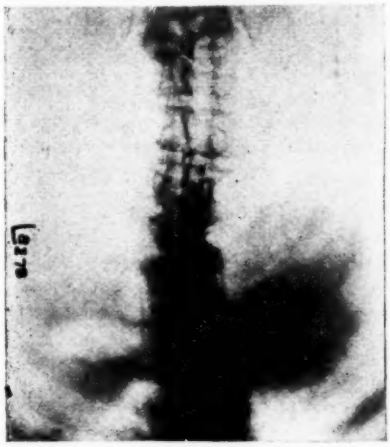

Fig. 9. Case 21. Spondylitis.

catheter was passed as far as the kidney. *X*-ray shows a spondylitis deformans, with curvature of the spine at the twelfth dorsal and first lumbar vertebra, right side. Diagnosis: Chronic spondylitis deformans, subacute general cystitis, stricture of left ureter, stricture lower end of right ureter. The patient was put on medical treatment, and advised to have further cystoscopic treatment with ureteral dilatation. (See Fig. 9.)

**This case illustrates, besides the presence of ureter strictures, the importance of the spondylitis deformans in causing some of the symptoms.**

*Case 22.*—L. M. Age 24. Referred because of a cystitis and left pulmonary tuberculosis. Examination shows patient in poor health; hemoglobin 76 per cent, w.b.c. 13,600, pus cells 4 in urine, no reds, tender left kidney. *X*-ray shows this kidney to be twice normal size, no evidence of opaque shadows. Cystoscopy shows moderate congestion of bladder, bladder wall bleeds easily on touching; has a superficially ulcerated appearance, no definite tubercles noted. The catheterized urine, however, showed tubercle bacilli, and a diagnosis of tuberculosis was made. Nephrectomy was done on the left side. The symptoms of cystitis were due to the tuberculosis, and while he has a moderate

Fig. 10. Case 24. Large calcareous shadow in bladder region.

lung infection, the important trouble was the left kidney tuberculosis. This kidney was completely destroyed, containing many pockets filled with pus, and very little functioning tissue.

**This case shows the importance of always suspecting tuberculosis in intractable cystitis.**

*Case 23.*—C. M. V. Age 64. States that he had severe pain in right abdomen after lifting heavy weight. Examination showed tenderness in right lumbar region, especially at transverse processes; also in lower abdomen and groin, near attachment of iliopsoas muscle; w.b.c. 9,900; history of having blood in urine at times; patient feared he had appendicitis. An *x*-ray showed no evidence of urinary calculi; moderate osteoarthritis of lumbar spine, some changes in the left hip joint, with ankylosis. Because of the hematuria, the patient was cystoscoped and the kidneys catheterized, which showed blood coming from the right side. Pyelogram showed the ureter and kidney pelvis well filled with 15 per cent sodium bromide solution. Kidney normal in size, outline definitely irregular and somewhat moth-eaten in appearance. Ureteral course slightly tortuous.

**Under local treatment this patient improved. What was thought primarily to be an appendicitis proved to be a spondylitis with right kidney infection.**

*Case 24.*—Mrs. M. A. Age 77, widow. Patient had diabetes for years, which improved under treatment, but kept recurring, as the patient backslided on her diet. She comes because she has had nocturnal pain, which resembled renal colic, pain in left flank, radiating into abdomen and bladder; some dysuria and frequency; morphia or codein relieves. She also gives history of recurrent attacks of sciatica on the left side. The urine appeared negative; roentgenograms of the kidney and spine were made, the plates showing what seemed to be a large bladder stone. It was suggested that this be removed by lithotrite. A few days later, under epidural anesthesia, cystoscopy showed no stone in the bladder. A re-ray with cystogram showed this

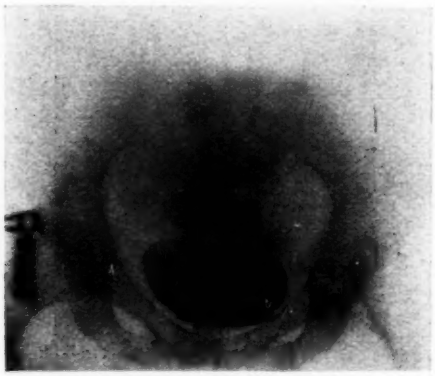

Fig. 11. Case 24. Calcareous uterus, outside of bladder.

shadow to be posterior and above the bladder and ureters; bimanual examination showed a nodular uterine hardness. It was suspected that this shadow was caused by a calcareous uterine body, and because of great discomfort from pains requiring morphine for relief, it was decided to do a hysterectomy; this was done under sacral anesthesia, with suprapubic infiltration, and about 20 c.c. of ether for inhalation. The uterus had a body size 4x3 inches, with hard calcareous nodules, size 4 cm. in diameter. (See Figs. 10 and 11.)

The interesting aspect of this case is that what was thought to be bladder stone, with symptoms of bladder irritation, proved to be a calcareous uterine body, causing pelvic pressure.

*Case 25.*—E. B. Age 30. Comes with history of backache for three or four years, repeated attacks of sore throat, slight fever, the urine contained few pus cells. Attacks made one think of kidney stone, because of the colicky nature. An *x*-ray showed what appeared to be a calculus in the left ureter opposite the fourth lumbar vertebra, and in order to identify this, cystoscopy was done, showing quite an obstruction several inches up left ureter. Stereo *x*-ray showed in one plate that this obstruction was exactly at the tip of the ureter; with a history of renal colic and evidence of slight infection in the kidney, one would conclude that this patient had a ureteral stone, obstructing at this point. However, when the picture was put in the stereo, it showed that this shadow was at a level posterior to the ureter. In examining the patient's back, it was found that he had a pigmented wart on his back, which was causing the shadow. (See Fig. 12.)

This case illustrates the importance of stripping the patient completely; also of making stereograms rather than a flat plate. How chagrined we would have been if we had cut down to remove a stone from the ureter, when the patient's trouble was a mild chronic pyelitis, due to a dental infection, and the shadow was really on his back.

Fig. 12. Case 25. Pigmented mole on back (left ureter region).

## CONCLUSION

The general surgeon should have a working knowledge of urologic conditions, as to structure and function. He should be personally qualified to make the necessary examinations and tests, or co-operate with those who are. With the aid of the internist, laboratory specialist and roentgenologist, he should get all the available data of the patient as a whole, as well as the local findings.

Finally, the mere technical operator must know biology and physiology and their relation to the disease at hand before conclusions are drawn and a plan of attack is formulated. This will give the clue and indication as to whether or not to operate, what to operate, when to operate, and include a well-rounded after-care and treatment of local and general conditions.

I wish to acknowledge the very good co-operation of Doctor A. J. Wentworth, the roentgenologist, and of my other colleagues in the Mankato Clinic, in the examination, diagnosis and guidance of these cases.

# AN UNUSUAL CAUDA EQUINA LESION*

## REPORT OF CASE

JOEL C. HULTKRANS, M.D.
*St. Paul*

This case is reported because of its interest and because Lipiodol was used and found to be of value. It demonstrates one type of *x*-ray picture seen with the use of iodized oil as an aid in localizing subarachnoid block. In the discussion Dr. Ahrens presents a case in which Lipiodol was used, showing a different type of picture.

The patient is a male, aged 32, single, a shoe repairer.

His family history, as far as could be ascertained, was entirely negative. He came to America from Greece in 1910, and has not as yet mastered the English language very well. He has never been sick up to the onset of the present illness.

When first seen on December 1, 1925, he was in bed, complaining of weakness in the legs, loss of energy, and said that he had syphilis. He was seen at his home and no satisfactory history was obtained except the fact that he said he had syphilis and had been treated for about five years for this and was getting worse. Because of this history and because the neurological findings could be explained on a syphilitic basis he was sent to the hospital for a spinal puncture and further study.

The fluid obtained from the puncture was yellow and contained no red blood cells although the benzidine test for blood was strongly positive. The Nonne was 3 +; cell count 1184/3; the gold solution 0001112333; Wassermann negative; coagulation occurred on standing.

This fluid made us feel that we were probably not dealing with lues, and the following morning an effort was made to get a better history, and the following is what was obtained from several sources: In 1920 he consulted a physician because of a rash on his face. This was treated as a simple skin condition. While he was treating for this he said he had a chancre. From his poor description and its rapid response to simple antiseptic treatment, it is not very likely that this could have been a hard sore. He was given a few neosalvarsan injections intravenously at this time, and states that the doctor told him that he did not have syphilis but to satisfy him he was giving him a few "shots in the arm." At the end of this course blood was taken for examination and this he was told came back 4 + positive. Treatment was then started again and kept up from three to four months, when another blood was taken which was said to be 3 +. He was treated then continuously until a year ago when he quit of his own accord. All this time he had absolutely no symptoms except the rash on his face, which cleared up and then came back again, and again disappeared. There were numerous blood Wassermanns taken but none of these were positive except the two mentioned above. He continued feeling well until three months ago, when he consulted a physician because of headache and loss of energy. He was sent to the hospital for a week and his headaches improved, but when he got home they returned again, and he was then sent to another hospital. Here spinal fluid examination was done and he was given a neosalvarsan intravenously followed by spinal drainage. Following this he developed a very severe nephritis and was transferred to the medical service, where he remained for one month for treatment of his nephritis. During this transfer it seems that his name was not obtained accurately and only the cell count and character of the fluid was recorded, and this was much as we found it. It was about the middle of October, 1925, when he first began to notice numbness in his toes, and this had progressed up as high as his knees by the middle of November, when he left this hospital. Shortly after he got home he could not walk as well, his legs were stiff and weak, and about a week before we saw him he began having discomfort in his bladder region.

General physical examination showed nothing of importance. Upon neurological examination the pupils and all cranial nerves were normal. There was an absence of the ankle jerks, and the right knee jerk was possibly a little greater than the left. There was a small area on the back of each calf extending down over the heel that showed a diminished response to all types of stimuli. There was extreme pain over the sciatic upon pressure and on putting the nerve on the stretch. There was a subjective numbness below the knees. There was a weakness of the flexors of the knees and ankles and a questionable diminution in position sense of the great toes. A pain and a feeling of full bladder were present even when it was empty. Bowels moved only with an enema.

All these symptoms progressed so that within a week after he entered the hospital, although he said he felt better, he had a complete retention, and was unable to stand on his feet at all. On December 8, a week after admission to the hospital a spinal puncture was repeated, and preparations were made for a combined lumbar and cisternal puncture. Lumbar puncture was done between the second and third lumbar vertebræ because of pain at the site of the previous puncture, which had been done between the third and fourth. This revealed a pressure of 280 mm. at the beginning, which rose to 320 with jugular pressure. Five c.c. of yellowish fluid were removed, and the pressure fell to 30 and again went to 100 with jugular pressure. The fluid showed a gelatinous web on standing; a 2 + Nonne; 488/3 cells which, when stained, were mostly lymphocytes, some pmn's and considerable debris; Wassermann and colloidal gold were negative. Because no block could be demonstrated above the puncture point, cisternal puncture was not done. One and a half c.c. of Lipiodol was injected through the needle between the second and third lumbar vertebræ.

Because of the progression of symptoms—paralysis of the bladder and legs, loss of ankle jerks, pains like those of sciatica and crural neuritis, the analgesia over the back of the calf—and from the pictures, the diagnosis of caudal tumor was made, and operation in the region of the second and third lumbar vertebræ advised.

*Read before the Minnesota Neurological Society, St. Paul, February 2, 1926.

The patient was operated upon December 16 by Dr. Robert Earl, and the following is the report of what he found at operation: "At operation performed a laminectomy, removing the spine and the lamina of the first, second, third and fourth lumbar vertebræ. Found a dense fibrous tissue adherent to the dura and the anterior surface of the lamina of the third lumbar vertebra. There was a bony exostosis on the anterior surface of the lamina of the fourth lumbar, which made pressure on the cord. On opening the dura the arachnoid bulged through the dural opening, and when the pia was opened a considerable amount of straw-colored fluid escaped. The cord was of a darker color at the point under the third lumbar lamina where the adherent fibrous tissue had been situated. The spinal fluid coagulated and became gelatinous on exposure to air. I lifted the cord and examined the anterior surface with negative findings. The dura was opened the full length of the first four lumbar vertebræ, and a groove director its full length was passed up and down from the upper and lower end of the dural incision. No obstruction was met with."

The patient made an uneventful surgical recovery, the wound healing by first intent, and since the operation he has regained complete control of his bowels and bladder, and is walking about seventy-five steps a day. The subjective numbness complained of is now more of a hyperesthesia, and the trophic disturbances seen along the sides of his feet have entirely disappeared. His ankle jerks are still absent.

I thought it would be of interest to the Society to present at this time some of the impressions from the literature on iodized oil. Lipiodol was introduced in Paris for therapeutic use in 1912, and in 1921 Siccard and Forestier introduced it as an aid in diagnosing sub-arachnoid block by showing it to be opaque to the *x*-ray and non-irritating to the meninges. Since this time it has gained a wide use, and especially as an aid in localizing spinal cord tumors. It is a 40 per cent iodized poppy seed oil. In France they use a preparation called Lipiodol put out by LaFay, and in Germany one called Iodipin put out by Merck.

Ayer and Mixter[1] report irritative effects on meninges of animals reaching its height in twenty-four to forty-eight hours following injection, with cell counts of 1,000 and moderate increase in protein content. These reactions subsided gradually in ten days and fluids returned to normal. It was also noted by Mixter at operation on two patients twenty-four and forty-eight hours after injection that the meninges were somewhat thickened and reddened and the fluid was turbid. One French author also mentions this (DeMartel). Mixter states that all his patients (12) had moderate headache, backache, and temperature, disappearing in a few hours or days, and in one case an increase of paralysis. Laplane, an associate of Siccard, has collected 300 cases from French literature and reports no fatalities. He says that injection is usually painless, although there may be root pain in the vicinity of the tumor, and mentions this as a diagnostic sign, and further states that the reaction of the spinal fluid is mild. Ebaugh of Denver in the American Journal of Medical Science for June, 1925, reports three cases in which Lipiodol was used without reactions. Peiper in the Deutsche Medizinische Wochenschrift of January 1, 1926, states that irritation from the injection occurs in 50 per cent of the cases and lasts for about five days. This consists of pains within the spine, temperature elevation, and headache. No deaths followed. He cites a case where a boy died fourteen days after injection, but a postmortem showed miliary tuberculosis. The meningeal irritation with increase in cell count disappeared within two weeks. He quotes from the literature: One investigator found a facial paralysis that recovered. Another found a disturbance of respiration and slight deliriousness after the oil had settled around a tumor of the cervical cord. One patient suffered from a severe neuralgia of the caudal roots. There was no late damage noted after five years. He states that

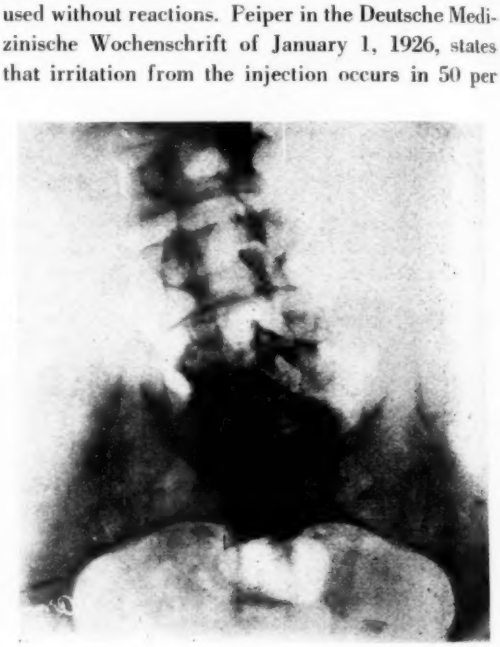

Fig. 1. Shows the normal arrest of the oil in the cul-de-sac in a case where there was no obstructon.

[1] Archives of Neurology. Vol. 14, p. 35 (July, 1925).

Nonne proved that Iodipin in average doses does not produce any histological damage to the cord. He mentions a subjective supersensitiveness in some cases, especially in goiter patients. In the January, 1926, issue of the Annals of Surgery, Sharpe and Peterson of New York report less favorably. They believe that Lipiodol is not absorbed but becomes encysted, and report three cases, the first where the oil aided in localizing a block at the lower level of the seventh dorsal. This patient was operated upon twice and although he recovered from the operations his neurological symptoms were progressive. The second operation revealed the oil encysted at the level of the lesion. A year later the patient's condition was worse, and *x*-ray disclosed one round globule of Lipiodol at the level of the eighth dorsal. They express their surprise and disappointment in finding a globule of oil one year after its injection, and especially that his condition had become worse following its use, localizing at the site of the encysted oil in the dorsal area. In a second case a block was localized at the tenth dorsal region and two days of increased pain in the lumbar area and in both legs followed the injection. Spinal fusion operation was successful, and the patient gradually improved. Fifteen months later oil was found in the cul-de-sac. Injection in a third case showed no block but caused severe pains in the lower lumbar area and down the left leg. Sixteen months later oil was found in the cul-de-sac, and the Trendelenburg position for one hour caused no alteration in its position. He thinks this means that oil is encysted in the cul-de-sac, and expresses in his conclusion a word of caution, especially in using the oil as an early routine confirmatory method of diagnosis. In this connection Ayer and Mixter's experimentation on cats is interesting. They injected a small quantity of mercury into the subarachnoid space and found in some cases that in order to change its position the cat had to be shaken quite vigorously, much as one would shake a clinical thermometer.

As to its value and accuracy, all users seem to be of the opinion that it is of value, but all also seem to agree that it is only an aid in diagnosis, and that clinical information is more reliable than the oil. There are several cases reported where the *x*-ray has shown an arrest of the oil, and operation revealed no tumor. Probably a more accurate knowledge of *x*-ray interpretation will reduce the failures and increase the value of the oil. Probably the two most important points in the interpretation of the *x*-ray are, first, a persistent stop, and, second, the character of distribution and shape of the opacity. Several pictures must be taken. Peiper states that the disseminated and drop-like arrest of the oil is suspicious of an adhesive process. He further classifies the finding in spinal cord tumors: (1) a permanent stop of the oil on the upper tumor pole; (2) a greater part of the oil stays on the upper tumor pole and the rest descends and surrounds the flanks of the tumor; and (3) the oil stays as in type 1 and 2 and twenty-four hours later most of the oil is in the cul-de-sac. By this classification he claims to be able to differentiate in some cases extra- from intra-medullary tumors, and in some cases determines operability of the tumor. For intra-medullary tumors he makes the point that free passage of oil does not exclude a small intramedullary tumor. However, complete passage of the oil is extremely rare in the presence of a tumor, and he does not believe that an operation should be done unless the myelogram is positive. There are other men who feel they can differentiate be-

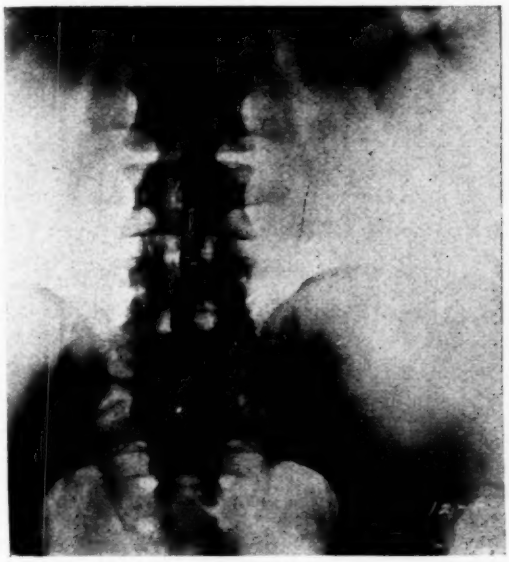

Fig. 2. Permanent disseminated drop-like arrests which are suspicious of adhesive processes, and the greater bulk of the oil at the site where pressure on the cord was found at operation in the case reported.

tween false and true arrest of the oil by the shape and distribution of the silhouette and in many cases can determine the type of the block and its operability. I believe most users feel that best results are obtained by injecting the oil through a cysternal puncture, for, even before sufficient time has elapsed to allow the oil to become encysted, it does not always flow from the cul-de-sac with change of position of the patient.

Summary: There is some irritation from the oil in at least some cases. It is probably unabsorbable and may become encysted. It goes without saying that if there is no block there is nothing to stop the oil, and it is of no value. It is of value as an aid in localizing subarachnoid obstruction when the history and the neurological findings are not sufficient to justify a diagnosis, and this value lies chiefly in its accuracy of localization, which minimizes the extent of the operation.

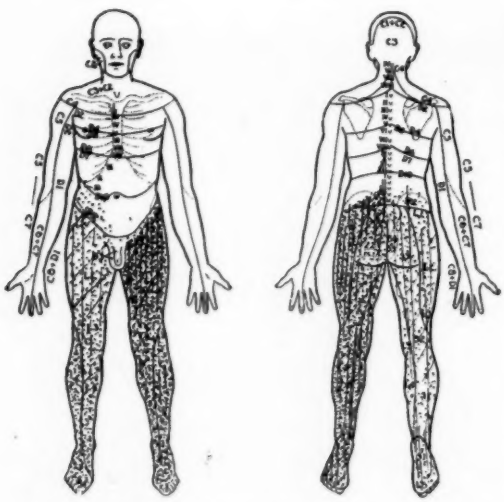

Fig. 1. Degree and distribution of superficial sensory loss indicated by shaded area.

## DISCUSSION

Dr. R. S. Ahrens (Minneapolis): I have used Lipiodol by the lumbar route several times with little or no success in localizing an obstruction. I doubt whether it is of any value used this way unless the patient is completely inverted and kept so for a period of time, which is impractical except, as in the case reported by Dr. Hultkrans, where the obstruction is below the lumbar puncture point.

By the cistern route, however, the oil is of value, as has been demonstrated by many observers. At the present time we have a case under observation at the Minneapolis General Hospital, which I hope will give further proof of the localizing value of this procedure, and which I shall report fully at a later date.

This patient is a female thirty-nine years old. She was admitted to the hospital because of a fractured left femur and transferred to the neurological service because of spastic paralysis of the lower extremities.

The history of the onset and development of this condition is as follows: Five and one-half years ago the patient began to have pain in her knees. Three months later a weakness of both legs developed. Nine months later there was a marked numbness in her right foot and at about the same time some difficulty in controlling her bladder and bowels. The numbness was then felt in the left foot and slowly progressed up both extremities until at about the end of two years both sides were involved. The motor

Fig. 2. Oil shows total block at level of third cervical vertebra.

weakness also progressed steadily until at the end of the first year the patient was unable to move her legs. This paralysis was of a spastic type. There was occasional radiation of pain in the lower extremities and some pain in the chest and between the shoulder blades, which were spoken of as occurring in attacks. The left side has always been more involved than the right. The patient managed to get about with the aid of braces for both legs, but there was no marked improvement in sensory or motor disturbance. The sphincter control returned, but has been periodically weak. There has never been any involvement of the arms and her history otherwise is entirely negative.

Her first examination showed the pupils to be normal and the cranial nerves uninvolved. The reflexes in the upper extremities were normal. The knee jerks, right and left, were plus three on a scale of four. The ankle jerks were plus four, right and left, with clonus. Babinski,

Chaddock and Oppenheim gave brisk dorsal flexion on both sides. Her sensory findings were as indicated in the chart (Fig. 1). There was definite impairment to all forms of superficial sensation over both lower extremities, but definitely more marked on the left than on the right. Also on the left there was a definite segmental level (first lumbar) which was constant day by day, whereas on the right no definite level could be established.

Spinal fluid examination was made. The fluid was clear, colorless, and did not coagulate. The initial pressure (direct reading type of manometer) was 100 millimeters with respiratory oscillations of one-half a cm. and with cardiac oscillations very slight. There was no response to jugular compression. Cough and inspiratory response was normal. Movement of the head caused a corresponding change in the pressure reading but after the removal of 5 c.c. of fluid this caused no change.

After several days an attempt was made to do a combined puncture but because of complaint of severe pain in the shoulder and neck the cistern puncture was abandoned and Lipiodol was injected by the lumbar route. *X*-rays following this with the patient lying with hips elevated showed the oil at about the level of the upper lumbar vertebræ. We did not feel that the pictures were at all conclusive. There was no reaction following the injection of the oil and the sensory findings remained the same.

About a week later cistern puncture was again attempted, this time without difficulty, and 2 c.c. of Lipiodol injected by this route. An *x*-ray was taken with the patient in the sitting position about one-half hour after the injection (Fig. 2). You will notice that the oil has stopped at the level of the third dorsal and also that the lower surface of the oil has a definite convexity which appears to conform to the curved outline of a tumor mass. The following day the patient complained of pain in her chest and between her shoulders. Sensory examination showed a definite level to pain, touch and temperature over the right and left sides but more marked on the left, at the segmental level of the third dorsal segment. *X*-ray showed the oil at the same point and no change in outline.

At about this time the patient developed diphtheria. Upon her return from the contagious ward the sensory findings had receded to the same picture as when she was admitted.

Operation will be performed as soon as the patient is sufficiently recovered from her infection. Until then nothing definite can be said as to the nature of the obstruction. If, however, it proves to be a tumor, this case will serve as an excellent example of the value of cisternal administration of Lipiodol in the localization of tumors. Certainly the sensory findings in this case give no clue as to the location of the obstruction and there is nothing to indicate cord involvement about the level of the lower dorsal or upper lumbar segments.

Injection of oil at the lumbar level gave no conclusive picture. Cisternal administration of oil showed total block at the level of the third cervical vertebra and following this the sensory findings changed to correspond to this same level.

## THE OCCURRENCE OF FROIN SYNDROME IN DIVERSIFIED SPINAL LESIONS*

GORDON R. KAMMAN, M.D.
Assistant in Neurology, University of Minnesota
*St. Paul*

The syndrome of xanthochromia and massive coagulation consists of a spinal fluid which is yellow in color, varying from a pale straw to a light amber, and tending to coagulate spontaneously upon standing. It contains a moderate number of cells, mostly lymphocytes. The fluid drips from the lumbar puncture needle sometimes normally, and sometimes with an apparent increase in viscosity. If allowed to stand in a test tube for a variable length of time it solidifies so the tube may be inverted without spilling its contents. This phenomenon, together with the yellow coloration of the fluid, is known as the "Syndrome of Xanthochromia with Massive Coagulation," or the "Nonne-Froin Syndrome."

This was first found in 1903 by Froin[1] in three cases of spinal disease. According to Mix,[2] who reviews the literature, the first case probably was a pachymeningomyelitis of the conus terminalis, the second a complication of multiple tuberculous foci of the bones, and the third was found in a case which ran the typical course of a Landry's ascending paralysis. A curious fact is that, while the presence of a Froin syndrome always makes one suspicious of a cord tumor, none of Froin's original three cases were tumors.

After Froin's report, several other authors reported finding of xanthochromic fluid in cases which appeared to be meningitic in character. In fact, Sicard and Descomps,[3] in 1908, even went so far as to say that the syndrome always meant meningitis, and never a tumor. However, Blanchetiere and Lejonne[4] found the same type of fluid, but without cell increase, in an intramedullary tumor of the spinal cord, and again in 1914 demonstrated a case of xanthochromia occurring in a sarcoma of the spinal dura in the dorsal region.

A few years later, Nonne[5] described a phenomenon which has come to be known as the Nonne syndrome. This consists in a marked increase in globulin (Nonne phase ii) with no cell increase or color change in spinal fluids drawn from cases of

*Read before the Ramsey County Medical Society, St. Paul, May 25, 1925.

cord tumor. Haines[6] believes that this is merely an early stage of the Froin syndrome.

All yellow spinal fluid does not coagulate and show an increased cell count; therefore, all yellow spinal fluid does not necessarily form what is known as the Froin syndrome. Its occurrence is not dependent upon any one pathologic state but is the result of the operation of factors common to many. Scully[7] has found yellow spinal fluid in many conditions, chief among which may be mentioned hemorrhage, lumbar puncture, tumors of the central nervous system or meninges, tuberculosis of the spine, hemorrhagic pachymeningitis and leptomeningitis, tuberculosis and cerebro-spinal meningitis, luetic myelitis and meningo-myelitis, poliomyelitis, transverse myelitis, cerebro-spinal syphilis, lethargic encephalitis, cardiac decompensation, pneumonia, appendicitis, and malaria. However, the true Froin syndrome, that is, xanthochromia combined with massive coagulation, is found in only a comparatively few conditions, such as tumors, tuberculosis, syphilis, certain forms of meningitis, and Landry's paralysis. It has also been found in several cases of anterior poliomyelitis. Scully[7] concludes that xanthochromia without massive coagulation indicates meningeal inflammation, or hemorrhage into the spinal fluid, while xanthochromia with massive coagulation indicates meningeal adhesions or compression of the cord by a tumor.

Mestrezat[8] in 1912 concluded that xanthochromia accompanied by massive coagulation should be distinguished from erythrochromia due to hemorrhage, although he ascribed them both to a common cause, *i.e.*, hemoglobin in the spinal fluid. Erythrochromia may accompany hemorrhage any place in the sub-arachnoid space, but xanthochromia, according to Mestrezat, was observed only in cases where the lumbar cul-de-sac was shut off from the rest of the sub-arachnoid space by a tumor or other space-constricting agent, and the fluid allowed to stagnate there. Haines[6] makes several differential points between xanthochromia and simple erythrochromia, saying that erythrochromia may be distinguished from xanthochromia by the fact that the former is a hemorrhagic pigmentation and is reddish or reddish brown, and shows a variety of color changes on successive days. Also, there is an erythrocytosis in the fluid of varying degree with an accompanying leucocytosis due to meningeal irritation by the red blood cells. On the other hand, xanthochromatic fluids have a high fibrin content and coagulate massively. Both erythrochromatic and xanthochromatic fluids contain a large amount of protein, but this is constant in the latter, while it decreases in the former.

Much has been written concerning the occurrence and recognition of xanthochromia with massive coagulation, and just as much has been written about its cause. Haines states that "any pathologic alteration of the vertebræ, dura mater, or arachnoid which leads to partial or complete obliteration of the sub-arachnoid space and the formation of a cul-de-sac, is capable of producing the syndrome of xanthochromia with excessive protein and massive coagulation." Mestrezat[8] presents two factors which *he* considers essential for the production of the Froin syndrome. They are: first, the formation of a lumbar cul-de-sac which is cut off from communication with fluid in the upper part of the cord, and second, the engorgement of the spinal veins below the level of the block, or an alteration of the vessel walls by the inflammatory process. Leshke[9] is of the opinion that xanthochromia is due to the formation of bilirubin, due to the action of a ferment which is produced by the disintegrating red blood cells, this ferment acting upon the membranes of the cord. He demonstrates the bilirubin by the Diazo reaction in yellow spinal fluids. Xanthochromia, therefore, can occur in any case in which red blood cells find their way into the spinal fluid. It does not follow, however, that massive coagulation will be a concomitant phenomenon. According to Leshke, the true Froin syndrome is found in only about one-sixth of the cases of xanthochromia, and is associated with a narrowing process in the spinal canal.

Nammack[10] reported ninety-six cases of xanthochromia, only six of which showed the complete Froin syndrome. Two of these six were meningeal hemorrhages, two, tuberculous meningitis, and the other two were poliomyelitis. In an examination of 5,801 spinal fluids, xanthochromia occurred in 1.6 per cent. Sixty-six and two-thirds per cent of the cases of tuberculous meningitis showed xanthochromia, but most of these showed no massive coagulation. Nammack concludes: (1) That yellow spinal fluid occurs in a wide range of diseases of the spinal cord; (2) the complete syndrome of Froin is comparatively rare in its occurrence; (3) in acute or sub-acute conditions the presence of yellow fluid strongly suggests the probable diagnosis of tuberculous meningitis or poliomyelitis.

Mix[7] states that xanthochromia occurs in three types of cases: (1) Acute cases, probably all meningitic; (2) cases of paraplegia, either spastic or flaccid and due to a pachymeningomyelitis of the lower part of the cord, probably the conus terminalis, and (3) tumors of the cord or its coverings. Ayer,[11] injecting blackened paraffine into the dorsal epidural space of cats and experimentally producing symptoms of cord compression and then examining the cords post-mortem, showed the cord to be swollen, the vessels congested and enlarged, and a mild polymorphonuclear cellular infiltration, with considerable serum and some free blood at the site of the compression. Fluids which clot and contain the greater amounts of protein are found in the cases showing the most marked pressure symptoms. He concluded that spinal fluids coming from below the areas of compression usually show marked increase in protein content, at times are yellow, and clot spontaneously. Furthermore, he believed that fluids obtained from the sub-arachnoid space above the level of compression were normal. Later, however, Cushing and Ayer report five cases in which xanthochromia with massive coagulation was present in the spinal fluid above tumors of the cauda equina. Hammes[13] also reports one case of this latter type.

Cushing and Ayer differ in their individual opinions as to the actual cause of the Froin syndrome. The former believes that the phenomenon is produced by a transudation into the fluid from the tumor itself, and that all tumors which are subarachnoid and are bathed by cerebro-spinal fluid are accompanied by some degree of xanthochromia. Ayer, on the other hand, ascribes the changes in the fluid to the transudation from engorged veins in the spinal canal. It would seem to the writer that, in view of the variety of conditions other than tumors in which the Froin syndrome is found, the theory relative to the vascular origin of xanthochromia and massive coagulation is found the more tenable. Both Cushing and Ayer now agree that the fluid trapped below a tumor is the same as that above, only more concentrated and stagnant, while that above the tumor is dilute and circulating. They believe this to be the reason why the fluid below a tumor is more yellow and clots faster than that above it. Appreciation is hereby extended to Dr. E. M. Hammes for the opportunity of presenting the following cases:

Case 1 is a typical example of a spinal cord tumor presenting a complete Nonne-Froin syndrome below the site of the tumor:

Mrs. X, referred to Dr. Hammes by Dr. J. A. Lepak, was a white married female, 35 years of age. She was first seen by us on July 30, 1924. Her family history was negative. Five years before coming under our observation, she had had a tumor removed from her right side. The exact nature of this tumor is not known, but it probably was either a lipoma or a fibroma. In the winter of 1921 the patient fell on the ice quite hard and injured her coccyx. There had been some pain in this region ever since. Sometime in December, 1923, the patient began to have numbness and burning in both feet. She stated that it felt as if she had chilblains. These paresthesias continued intermittently,

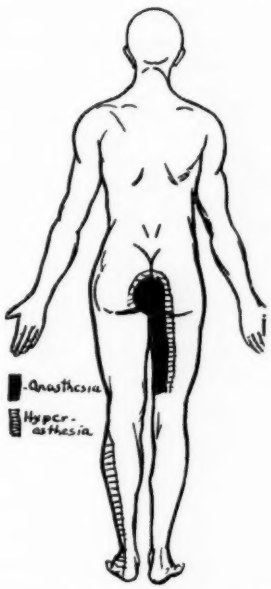


Fig. 1. Areas of sensory disturbance in Case 1. Black area represents anesthesia, and shaded areas hyperesthesia.

and a little later she began to have pain in the lower lumbar region, associated with a "full" feeling in the perineum. Later she developed what she described as a "grabbing pain" in both legs, extending down the calves and into the ankles. These pains were not steady, but were worse on motion. In the latter part of June, 1924, the patient began to notice that she dragged her left foot. She then gradually became weak in both lower extremities, and experienced considerable difficulty in walking. About one month later she developed overflow incontinence of urine and the pains in her legs became more severe. She became bdridden, could not walk, and had to be catheterized daily. Her bowels moved only with the aid of enemata.

Neurological examination at that time showed the pupils and cranial nerves to be normal. The upper extremities were negative throughout. Abdominal reflexes were nor-

mal. There was a flaccid paresis of both lower extremities. Patellar tendon reflexes were decreased and the Achilles jerks were absent. There was no ankle clonus or Babinski. Sensation was normal throughout except for an area of impaired tactile, pain, and temperature sense around the anus and over a small band down the posterior surface of the right thigh to within three inches above the knee. Just outside the zone of anesthesia was an hyperesthetic band. There was an hyperesthetic area along the outer surface of the left leg from about the middle to below the foot. Deep muscle sense was normal.

The spinal fluid was under increased pressure, rapidly dropping to normal. It was yellowish and formed a yellow coagulum on standing. There were four cells per cubic millimeter, Wassermann was negative, globulin four plus, and the colloidal gold curve read 0123344310. A diagnosis of spinal cord tumor at the level of the fifth lumbar segment was made, and the patient was operated on by Dr. A. R. Colvin on August 7, 1924. At operation a glioma of the conus medullaris was found. Because of its infiltrating nature it could not be removed, and the patient died a few weeks later from metastatic gliomas of the brain.

Case 2 is an example of a spinal cord tumor presenting a complete Nonne-Froin syndrome above the level of the tumor. This case has already been reported by Dr. Hammes, so only a brief summary of the salient points will be given here.

A. B., referred by Dr. Lerche of St. Paul, was a white male, sixty years of age. His past and personal histories were negative. In about August, 1921, he began to have pain and soreness on the inner side of the right thigh. This continued for about six months and then rapidly grew worse. About January, 1922, this pain was severe and throbbing in character, and was worse when the patient was lying down. This continued until July, 1922, when it improved somewhat. However, he still continued to have neuralgic attacks along the course of the right anterior crural nerve, and said at that time that he felt a slight indefinite numbness along the outer surface of the left thigh. The neurological examination was essentially as follows: There were definite trigger areas along the course of the right anterior crural nerve; left anterior crural nerve; to the right and left of the second, third, and fourth lumbar vertebræ; and on the sole of the right foot. The left pupil was very slightly irregular. There was some rigidity of the erector spinæ muscles. Bladder and sexual functions were normal. Lumbar puncture between the second and third lumbar vertebræ yielded 20 c.c. of golden yellow spinal fluid under normal pressure. In ten minutes the fluid solidified in the tube. There was an excess of globulin, and six cells per cubic millimeter of fluid. (The count was unsatisfactory because of the coagulum.) Wassermann was negative, and the colloidal gold curve read 0012332110. About February 7 the patient developed marked edema of both ankles, especially the right, accompanied by profuse localized sweating. The right patellar and Achilles jerks were sluggish, and there was indefinite impairment of pain and tactile sense over the left gluteal region. The right thigh was three centimeters smaller than the left at the same level. In the absence of cord symptoms a diagnosis of tumor of the cauda equina was made and the patient operated by Dr. Lerche on April 16. At operation yellow spinal fluid was found above and below a tumor of the cauda equina. The tumor was removed, and examination made by Dr. E. T. Bell of the University of Minnesota revealed it to be a hard fibroma. The patient ran an uneventful convalescence and three months later was able to return to work.

Case 3 is illustrative of what probably was a diffuse syphilitic lesion of the central nervous system, probably a loculated meningitis, although, as will be seen, both the blood and spinal fluid gave negative Wassermann reactions.

Mr. Y., referred by Dr. Hendrickson of Enderlin, North Dakota, was a white, married male, 53 years of age. Until the onset of his illness he had been engaged as a locomotive engineer. His family and marital history was negative. The past history was essentially negative except that he had had gonorrhea when a young man. In August, 1923,

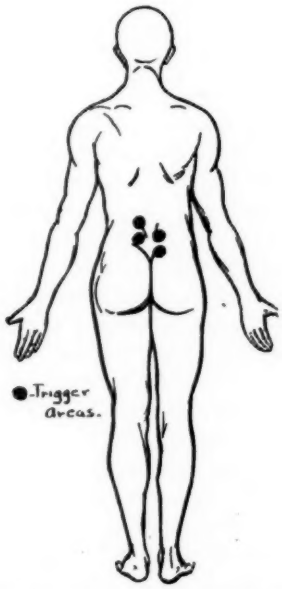


Fig. 2a. Trigger areas in Case 2. Black dots represent points at which pressure would produce painful spasms.

the patient had had an attack of herpes zoster involving the left shoulder and side. He recovered from this in about one month. In the early part of October, while the patient was talking to his wife, she noticed that he seemed to be too tired to talk, and that the left side of his mouth would draw up at times. He seemed to be confused and acted as if he had been drinking. He staggered some while walking. This soon cleared up, however, and the patient was well again until the latter part of October, when, after he had finished his run and was eating in a lunchroom at two o'clock in the morning, he suddenly noticed a marked weakness of his left leg and arm. He was unable to walk unassisted, and was taken to his hotel, where he undressed himself and went to bed. There was no headache, vertigo, vomiting or visual disturbance. The next morning the pa-

tient got up and hobbled around unaided. Blood pressure at that time was 132-80. That evening he went to bed, where he remained for a few days. On the fifth day he walked for a distance of five blocks, but his gait was spastic and his legs felt weak. In December, 1923, he began to have pains in both shoulders, especially the right. This pain did not radiate, but for two weeks was so severe that the patient was unable to raise his right arm. After a few weeks this subsided, but there has been some pain ever since. In February, 1924, the patient's left arm became so weak that he could hardly raise it. This came on in two or three days and finally the arm became useless. About one week later, the right arm acted in a similar manner. There was no disturbance in the legs at this time. In about ten days the arms began to improve and later became useful again, and the patient was able to dress himself, eat, write,

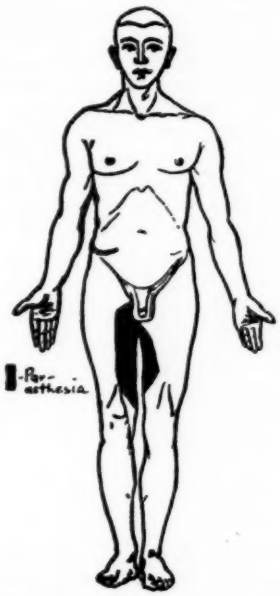


Fig. 2b. Trigger areas in Case 2. Black dots represent points at which pressure would produce painful spasms.

etc. About June 10 the patient began to have difficulty in starting his urine. On June 15 both of his legs became weak and the bladder condition progressed. Patient could not feel bladder distension, and on June 18 he had to be catheterized. He felt weak all over and by June 19 was unable to walk because of a spastic paraplegia of the lower extremities. He stated that his sexual power had been markedly diminished since the fall of 1923. He was seen by us on June 19, 1924, and the neurological examination at that time revealed the patient to be well developed and fairly well nourished. He had a spastic paraparesis of the lower extremities and was unable to void spontaneously, although the bladder was distended to within three fingers of the umbilicus. The pupils were equal and regular and responded promptly to light and accommodation. With the exception of a slight weakness of the left seventh, the cranial nerves were normal. The fundi were normal and there was no nystagmus or alteration in the speech or voice. Both upper extremities had a very slight ataxia which was a little more evident on the left side. There was also a slight tremor of the left hand. The superficial reflexes were absent. The patellar and Achilles tendon reflexes were bilaterally increased, and Babinski's response was obtained on both sides. There was a bilateral ankle clonus which was slightly more pronounced on the left. Tactile, pain, and temperature sense was normal. Spinal puncture between the third and fourth lumbar vertebræ gave a straw-yellow fluid under markedly decreased pressure. Within three minutes it had solidified in the test tube. There were 25 cells per cubic millimeter and a four plus globulin. The colloidal gold curve read 3344444433 and the Wassermann was negative.

The patient was kept in bed on a super-nourishing diet. After a few catheterizations he began to void spontaneously and further catheterization was unnecessary. He was put on alternating injections of 2 grams of sodium iodide and 0.6 grams of neosalvarsan intravenously, one of each being given every week. After the first few injections the patient began to show marked improvement. He gained in weight, the stiffness disappeared from his legs, and he soon was able to walk. By July 17, 1924, he was walking eight or ten blocks a day and had gained about ten pounds in weight. Spinal fluid at that time was under normal pressure, was white, and did not coagulate upon standing. The globulin had decreased to two plus, but there were forty-seven cells. The Wassermann was negative. Because the patient had business interests in California, he was forced to move out there before he was completely well. However, a recent letter from him stated that he is feeling well, and walks with very little trouble. He should, of course, keep up treatment until the spinal fluid becomes normal.

Case 4 is of particular interest because the spinal fluid was examined before the pressure on the cord was sufficient to produce a complete Froin syndrome, and again afterward when a typical Froin syndrome had appeared. The patient was used by the writer for teaching purposes at Ancker Hospital through the courtesy of Drs. Goltz and Whitmore. He was a white, unmarried male, 66 years of age. He stated that for the eight years previous to his admission to the medical service on January 20, 1925, he had been suffering from pain over the lower lumbar and sacral areas. The pain was dull and steady in character and was increased by walking or standing. At times this pain radiated into the right groin. A little later the patient began to experience difficulty in voiding. There was some decrease in the size of the urinary stream, and also some burning and frequency. There was no hematuria. Upon admission he was unable to void more than a small amount at a time, although the bladder was distended to half way between the pubis and the umbilicus. The past history was negative from a neurological standpoint except for the fact that the patient had had "sciatica" forty years ago, at which time he was unable to walk for fifteen months. He denied gonorrhea, syphilis, and alcoholism.

On January 29 the urological consultant, Dr. Foley, detected no evidence of prostatic enlargement and concluded from his examination that the patient probably had a cord

bladder, due to some lesion of the spinal cord or cauda equina. At this time the urine contained two plus albumin with a few granular casts and an occasional epithelial cell. His hemoglobin was 60 per cent, red blood cells 4,460,000, and leucocytes 15,500. X-rays of the spine showed a suggestive lesion in the lumbar area with erosion of the intervertebral cartilage. On January 30, the neurological examination was negative throughout. Spinal puncture was performed at the usual site and 10 c.c. of fluid was removed under decreased pressure. The fluid was pale yellow and perfectly clear, and a pellicle or web appeared in it almost immediately. Examination revealed it to contain two plus

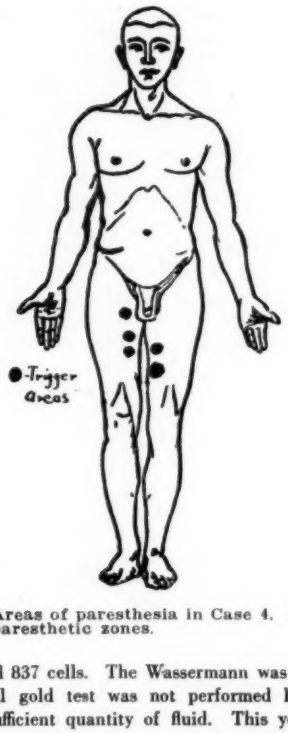


Fig. 3. Areas of paresthesia in Case 4. Black areas represent paresthetic zones.

globulin and 837 cells. The Wassermann was negative and the colloidal gold test was not performed because there was an insufficient quantity of fluid. This yellow type of fluid with pellicle formation is strongly suggestive of tuberculous involvement of the central nervous system, but the patient presented absolutely no clinical neurological evidence of such a disease. On January 31, he was apparently semi-comatose and sleeping a greater part of the time. He was being treated urologically for the bladder condition. His temperature varied between 99 and 101. On February 2, he complained of pain in the lower lumbar region and on the inner surface of his thighs. He said that it felt as if sandpaper were being pressed against his skin. On February 6 he developed a pneumonic process in both lungs and his temperature dropped to subnormal. On February 7, eight days after the first lumbar puncture, another spinal puncture was done, and yielded about 2 c.c. of fluid under very much decreased pressure. It took about one-half hour for the fluid to run out. The fluid was golden yellow in color and coagulated spontaneously. Because of the coagulum only two drops of the fluid could be examined and it contained many red blood cells and one polymorphonuclear leucocyte. Neurological examination was negative except for the lower extremities, which showed absent Achilles jerks and decreased muscle power on both sides. There was impairment of sensation to light touch over a ribbon-like area extending upward from the right outer malleolus for about five inches. All other forms of sensation were normal. The patient ran a variable course from this point on, the pneumonic process continued, and he died on March 5, 1925. Post-mortem examination of the spinal canal revealed a collection of pus extra-durally in the region of the lumbar vertebræ. This collection communicated directly with a large abscess in the surrounding muscle tissue. Dr. John Noble, pathologist at Ancker Hospital, who performed the autopsy, stated that in his opinion the pus originated from the lumbar vertebræ in this region and that it was of a specific tuberculous nature which had become secondarily infected. The anatomical diagnosis was questionable lumbar Pott's disease and extra-dural abscess with spinal cord pressure. When the first puncture was done, the patient evidently had enough cord pressure to give bladder symptoms and sensory disturbances, but not enough to produce a Froin syndrome in the spinal fluid. At the time of the second lumbar puncture eight days later, the pressure was sufficiently marked and prolonged to produce a typical syndrome of xanthochromia with massive coagulation.

## SUMMARY

1. The syndrome of xanthochromia and massive coagulation, or the Froin syndrome, consists of a yellow spinal fluid which coagulates spontaneously upon standing.

2. It usually indicates compression of the spinal cord.

3. It may be found either above or below the compressing lesion.

4. The Froin syndrome has been experimentally produced in animals by artificially compressing the cord with sub-dural injections of paraffine.

5. It probably is due to the transudation of substances into the fluid from engorged veins in the spinal canal.

6. The writer has observed the syndrome of xanthochromia and massive coagulation (a) above and below tumors of the spinal cord, (b) in diffuse syphilitic lesions of the central nervous system, and (c) in a case of cord compression by an extra-dural abscess.

## REFERENCES

1. Froin, G.: Gaz. d. hop. 76:1005, 1903. Quoted by Cushing and Ayer.
2. Mix, C. L.: Surg. Clin. of John B. Murphy, 4:317, 1915.
3. Sicard and Descomps: Gaz. d. hop. Oct. 20, 1913. Quoted by Mix.

4. Blanchetierre and Lejonne: Gaz. d. hop. Paris, 82:1303, 1909. Quoted by Cushing and Ayer.
5. Nonne: Deutsch Ztschr. f. Nervenh., 40:161, 1910.
6. Hanes, F. M.: Am. Jour. Med. Sci., 152:66, 1916.
7. Scully, F. J.: Arch. Neurol. and Psychiat., 10:83, July, 1923.
8. Mestrazat, W.: Le liquide chephalo-racidien, normal et pathologique, Paris, 1912. Quoted by Clarke.
9. Leshke: Deut. med. Wchnschr., Berlin, April 7, 1921.
10. Nammack, C. H.: Am. Jour. Med. Sci.., April, 1920, 540-541.
11. Ayer, J. A.: Arch. Neurol. and Psychiat., 2:158-164, August, 1919.
12. Cushing, H., and Ayer, J. A.: Arch. Neurol. and Psychiat., 10:167, August, 1923.
13. Hammes, E. M.: Arch. Neurol. and Psychiat., 2:82, January, 1924.

## DISCUSSION

DR. C. R. BALL: I have listened with much interest to Dr. Kamman's most excellent paper on this subject. The Froin syndrome became of general interest a few years ago when it was thought that it had a very valuable diagnostic significance in distinguishing between an extra-medullary and intra-medullary tumor of the spinal cord. Since then a number of conditions other than extra-medullary spinal cord tumors, or spinal block, have presented this syndrome. It is still, however, a very interesting phenomenon and has a certain valuable differential diagnostic significance when construed together with other symptoms in helping to distinguish between these two cord conditions. More recently other means of distinguishing spinal block have been discovered—notably by the introduction of a preparation of iodized oil, and other fluids similar in character, directly into the spinal canal, and after it has had time to gravitate up or down, as the case may be, the taking of an *x*-ray picture reveals whether the spinal canal is open or not. The injection of air may be also used for this purpose, taking a roentgenogram afterwards. With the Froin syndrome and these still newer methods of diagnosing spinal block our determination of this condition has been rendered quite definite and positive.

DR. J. C. HULTKRANS: As a matter of interest in this connection I wish to mention a case of tetanus in which massive coagulation of the spinal fluid occurred. This case presented the typical tetanus picture. A lumbar puncture was done but no fluid was obtained, although no difficulty was experienced in giving antitoxin, and after the antitoxin had been given it could be made to run out of the needle by lowering the apparatus. This was considered sufficient evidence that we were in the sub-arachnoid space. Two days later, on repeating the treatment, about 2 c.c. of a semi-gelatinous yellow-tinged fluid was obtained which solidified on standing in the laboratory. This patient improved rapidly and no further treatments or punctures were given. This is another case that emphasizes a point made by Dr. Kamman that this phenomenon is not pathognomonic of any particular condition, but probably indicates a stasis of spinal fluid.

DR. KAMMAN (closing): I am glad that Dr. Ball mentioned the injection of iodized oil into the spinal sub-arachnoid space and the making of a roentgenogram to determine the presence and location of spinal block, because it brings to our attention a valuable diagnostic aid. However, I do not feel that it ever will supplant a consideration of the Froin syndrome, because the latter when found in the routine examination of the spinal fluid will indicate a sometimes entirely unsuspected block or tumor and lead to further study of the sub-arachnoid space. Of course, when our technic reaches that stage of perfection where the sub-arachnoid space can be photographed, the studies on the Froin syndrome will become relatively less important.

I was intensely interested in Dr. Hultkrans' mention of finding xanthochromia with massive coagulation in his case of tetanus. In my review of the literature I did not find any reference to such findings in that disease, and I believe that Dr. Hultkrans' report is altogether unique.

---

The Division of Communicable Diseases of the New York State Department of Health has just issued a statement calling attention to forty-eight deaths from diphtheria which occurred during the months of January and February in the State outside of New York City. Forty-four of these 48 deaths were of children.

In the light of modern knowledge a fatality from diphtheria is considered by the Health Department as a needless sacrifice of human life, and every such death is investigated to determine where the responsibility rests. In only six cases was a physician summoned on the first day of illness. There is probably no infectious disease where prompt treatment is so necessary as in diphtheria. Medical research has demonstrated conclusively that if antitoxin is properly administered in sufficient dosage on the first day of illness to a patient suffering with diphtheria, death from the disease almost never occurs. Therefore, there were forty-two deaths in which the parents (or the patients themselves) were partly to blame in that they neglected to call a physician promptly.

On the other hand, in three instances a definite responsibility rests upon the attending physician for failure to give antitoxin, while in ten other cases there was a delay on the part of the physician in administering this remedy. —*Health News Service.*

# PULMONARY EMBOLISM*

S. F. Herrmann, M.D.
*Welcome, Minn.*

Whenever the tragic accident of massive pulmonary embolism occurs it arouses widespread interest. It is rare, yet almost every layman can tell of the case of some friend who following an operation, or some serious illness, was reported as recovering nicely, when suddenly he raised up in bed, gasped for breath, and dropped back dead. A large thrombus from some known or hidden location had entered the blood stream and blocked the pulmonary aorta, or one of its major branches. Published reports deal mainly with this fatal form of postoperative embolism.

Wharton and Pierson[1] in 1922 reported eleven cases of embolism following 1,600 gynecological operations at Johns Hopkins Hospital, an incidence of .68 per cent. Two of their cases were of the classic massive type, and nine were cases of minor infarction. Emphasizing the importance of the minor forms of embolism, they conclude that embolism is the cause of fully 50 per cent of pulmonary complications following gynecological and abdominal operations.

Heard[2] in 1924 reviewed the incidence of postoperative pulmonary embolism at the Mayo Clinic. From 1912 to 1920, in 125,164 operations there occurred 104 cases of gross pulmonary embolism, not including infarcts, an incidence of .08 per cent. Previously, Wilson,[3] from the same clinic, had reported thirty-six fatal cases in 57,000 operations from 1899 to 1912, a percentage incidence of .063.

Lindsay[4] in 1925 reports an incidence of .3 per cent in the London Hospital from 1919 to 1924, there being ninety-six cases in 31,426 operations. He quotes Rupp's figures, gathered in Berlin, giving the percentage incidence of .26 during the period of 1903 to 1920 in 22,689 operations. Rupp also computed the percentage mortality in internal diseases for the same period. In 13,000 autopsies, pulmonary embolism was the cause of death in 1.1 per cent.

These are figures from large institutions emphasizing the importance of embolism as a fatal complication, but to the average practitioner they may perhaps be less impressive than my own less pretentious experience. In the last four years, in general practice, I have encountered seven cases of pulmonary embolism. The condition is certainly much more common than is ordinarily recognized. A discussion of the chief clinical features of my own cases may be of interest.

Pulmonary embolism may complicate heart disease, particularly malignant endocarditis, or mitral stenosis with mural thrombosis in the dilated right heart chambers. It has been known to follow the administration of quinidin in cases of auricular fibrillation, when the return to normal auricular contraction led to the separation of large thrombi from the auricular appendages. The more common cause, however, is thrombosis in some systemic vein following operation, childbirth, or some infectious disease like typhoid fever or pneumonia. Prolonged recumbency and sepsis are important factors, as is also the age of the patient, since thrombosis is more prone to occur in patients past middle age who often exhibit circulatory stasis. The most frequent sites of the thrombosis are the deep pelvic or femoral veins, but the clot may arise in any vein. Magnus,[5] in twenty-four autopsies, found the thrombosis in the deep pelvic veins or vena cava seven times, right femoral 7, left femoral 6, spermatic 2, and multiple sites 2. In Hampton and Wharton's gynecologic cases[6] 41 per cent were associated with femoral thrombophlebitis.

The pathology in the lung depends largely on the size of the embolus, and on whether or not it is septic. A large thrombus blocking the bifurcation of the pulmonary trunk, or the entire right or left pulmonary artery, will cause sudden collapse from circulatory failure before much change has been produced in the lung. There is experimental evidence that from 52 to 66 per cent of the pulmonary circulation in animals may be shut off before any appreciable effect on the general circulation ensues. Just a little more obstruction, however, leads to sudden circulatory collapse.[7]

Smaller emboli, obstructing some branch of the pulmonary artery, will lead to hemorrhagic infarction. An infarct is typically pyramidal, the base at the periphery of the lung, with overlying pleurisy, and sometimes slight effusion. If the embolus be septic, abscess or gangrene of the infarct may result. These infarcts occur much more frequently in the lower lobes, and more often on the right side. Karsner and Ash[8] were able to produce real infarcts only in the presence of passive congestion. In nor-

*Read before the Blue Earth Valley Medical Society, Fairmont, Minn., May 28, 1925.

mal lungs small emboli caused an incomplete transient infarction only if they lodged near the angular lung edge; otherwise they did no damage. Virchow[9] was able to produce infarctions without the presence of passive congestion, but he used infective emboli.

There is no doubt that small emboli often pass unrecognized. It is probable that they may even be symptomless. This is suggested by Mann's observations[10] on experimental pulmonary embolism in dogs. He found it impossible to produce death or seriously imperil the life of the dog by repeated emboli, until the pulmonary circulation was greatly obstructed. Some emboli passed from the femoral vein to a branch of the pulmonary artery without producing any effect on either blood-pressure or heart-beat. Usually, however, there was a slight drop in blood pressure at the instant the embolus passed the heart.

Symptoms will vary with the extent of pulmonary pathology and therefore depend particularly on the size of the embolus. The varied symptomatology will be best brought out by discussion of individual cases.

*Case 1.*—Massive, fatal embolism. Mrs. O. M., aged 34, called me three weeks after the birth of her second baby because of pain and swelling in her right leg. She had noticed some pain in the leg for about ten days, but had paid little attention to it. Examination showed a slight swelling of the right leg and ankle, with moderate tenderness in the popliteal space. The right calf measured 1 cm. larger than the left. Temperature 99°; pulse 128. I diagnosed thrombophlebitis of the right popliteal vein and ordered her to remain in bed with the leg elevated on pillows and wrapped in hot towels. She did not feel sick, and the leg was so comfortable, that one week later, without consulting me, she got up. While walking to the breakfast table she had a sudden attack of vertigo. She sat down, and in a few minutes a second dizzy spell caused her to fall to the floor. I was called immediately, at 9:30 A. M., and found her lying on the couch in a cold sweat, pale but not cyanosed, breathing deeply, and complaining of a tight feeling in the precordium. Temperature 95°; pulse 130; respiration 26. The pulse was soft and easily compressible. She was evidently in shock. Examination of the chest showed nothing of note. The leg appeared normal with neither swelling nor tenderness. An embolus had evidently passed, but as yet had produced no findings in the chest. I ordered her to remain quiet and administered a sedative.

At 5 P. M. I found her feeling much easier. Temperature 98°; pulse 132; respiration 26. There were no abnormal findings except tachycardia and hyperpnea.

On the following morning she looked very ill, with an anxious facies, slight cyanosis of lips and nails, flaring alæ nasi, and an expiratory grunt. She complained of pain in the precordium, radiating through to the right infrascapular region. The pain was aggravated by deep inspiration, and any effort to turn in bed caused a fit of coughing. Temperature 98°; pulse 112; respiration 30. Examination showed no heart murmurs, no dullness in the chest and no abnormal breath sounds, but there was tenderness at a point to the right and above the navel, and below the right scapula (De Mussy's buttons). The liver was palpable three fingers below the costal margin. The costal margins flared equally but every deep breath caused a catching pain. I diagnosed right diaphragmatic pleurisy, caused by an infarct.

This diagnosis was confirmed the next day when she showed a temperature of 101.4°, pulse 137, respiration 36, more definite cyanosis, dullness in the right base posteriorly, with distant breath sounds and no râles.

On the following morning, the third day after the embolism occurred, she presented an unforgettable picture. She showed the most pronounced general cyanosis I have ever seen. Drops of cold sweat stood out on face and extremities. She looked like the corpse of one asphyxiated by drowning; yet she smiled, talked freely, and felt comfortable. There was no more pleural pain, and she was not at all restless. Temperature 97.2°; pulse 130; respiration 34. The radial pulse could barely be detected. Blood pressure was 84/60. The cardiac outline did not seem enlarged. There was no distention of the jugulars. A rough loud systolic murmur was now heard in the mid-precordium. It was not transmitted. The costal margins flared equally. Dullness and absent fremitus persisted over the right base posteriorly, and the breath sounds were distant, but râles could be heard in both bases. Marked abdominal distention was not relieved by an enema.

Evidently circulatory failure was imminent, but it was hard to account for the lack of demonstrable cardiac dilatation. I felt that the appearance of the rough systolic murmur probably indicated the presence of a thrombus in the right ventricle. Digitalin was given hypodermically, and codein by mouth to insure rest.

Conditions on the fourth day were much the same except that the blood pressure was still lower. I could palpate no radial pulse. Temperature 94 (oral); 101.2 (rectal); pulse 136; respiration 40. A definite friction rub could now be heard over the right lower lobe posteriorly, and breath sounds there were more audible. The rough systolic murmur persisted. Cyanosis was extreme. The patient rested quietly all day. In the evening, when she raised up to drink, she suddenly collapsed, and dropped back on the pillow dead. Permission for autopsy was refused, but I felt that the manner of her death confirmed the diagnosis of a thrombus in the right ventricle, which, loosened by the slight effort of drinking, suddenly blocked the pulmonary aorta. The extreme cyanosis in this case was probably due more to the enfeebled circulation than to the infarct.

*Case 2.*—Repeated emboli causing large infarcts. Mr. F. M., aged 29, on the twenty-fifth day of a mild typhoid fever developed left femoral thrombophlebitis. He was kept recumbent, the left leg elevated on pillows and wrapped in hot moist compresses. He was not very sick. The temperature rarely rose to 99, but the pulse remained definitely dicrotic and averaged about 112 to 114. Blood

pressure 120/70; w.b.c. 15,200; hgb. 70. Ten days after the onset of the phlebitis he experienced a sudden attack of vertigo, followed by much belching. He felt better by the time I arrived, and I could find no unusual signs except an anxious facies, deep breathing, and an increase in the pulse rate to 140. There was no cardiac dilatation, no findings in the chest, and no cough. I prescribed Tr. Digitalis, thinking that the faintness might have been due to myocardial weakness. Thirty-six hours later the temperature had risen to 102; the pulse was still 140. He now complained of sharp, sticking pains in the right hypochondrium, aggravated by deep inspiration. Troublesome belching continued. There were no chest findings, but definite tenderness in the right upper rectus suggested diaphragmatic pleurisy. The diagnosis of infarction of the right lower lobe was confirmed the next day by the appearance of definite dullness in the extreme right base posteriorly, with distant breath sounds there and in the lower right axilla. The pleural pain was subsiding. On the fourth day more evidence appeared in the form of sputum consisting wholly of bright red blood clots. The temperature had dropped to normal, and the pulse to 120. Resonance was returning in the right base, the breath sounds were less distant, and there were no râles. At no time thus far had he shown any cyanosis. The next day, the fifth following the first embolus, and the 30th of his illness, he had another sudden syncopal attack, followed by much belching and a sharp pain in the right axilla, which was worse on inspiration. In a few hours the temperature rose to 101.5, but the pulse remained 112, probably because of the slowing action of digitalis. There was more extensive dullness in the right base, with absent tactile fremitus, and a definite dry friction rub appeared in the axilla. Evidently another embolus had reached the right lower lobe.

The fever gradually dropped again and he became more comfortable, but continued to expectorate blood. On the thirty-fourth day signs of another infarction appeared. The temperature again rose to 103.6 and the pulse to 140. The abdomen became markedly distended, and he now showed moderate cyanosis of lips and nails. In the next two days the patient improved rapidly, temperature and pulse dropped, he felt comfortable, but the cyanosis deepened to an indigo tint. The blood pressure was 140/80, indicating a competent myocardium. No new findings developed in the chest, and the cyanosis gradually cleared.

On the thirty-sixth day, without warning, a sudden stabbing pain was felt in the left chest. In a few hours a loud friction rub developed lateral to and below the left nipple, with some impairment of resonance and of breath sounds. This infarct, however, cleared up in the course of a week. Conditions in the right lower lobe changed slowly. Almost the entire lobe was functionless, as evidenced by a flat percussion note, and absence of breath sounds, voice sounds, and râles. On the forty-second day a few sibilant râles and breath sounds were heard, the sputum was less bloody, and we began to hope that our patient might continue to recover.

This he did, but not without first developing on the forty-third day, a thrombophlebitis in the right femoral vein. Fortunately, however, this second thrombus absorbed without sending any fragments on exploring expeditions into the lungs. We got our patient up into a chair on the fifty-fourth day. An area of dullness persisted for a long time in the extreme right base posteriorly, but after two months this, too, disappeared.

The striking feature of both cases was the very marked cyanosis. It is interesting to inquire into the possible meaning of this symptom. In Case 1 it influenced us to give a bad prognosis, but in Case 2 conditions were different. Cyanosis is caused by the presence of venous blood in the arterial system. Failure of sufficient air to reach the alveolar epithelium leads to incomplete oxygenation, and cyanosis results. This condition obtains in pneumonic consolidation, when bronchioles and alveoli are plugged with exudate, so that the blood flowing through the consolidated portion returns to the heart unchanged. If the blood supply to the unaerated portion is also shut off there will be no cyanosis, because the blood perforce follows some other channel to a functioning portion of lung, and therefore returns to the heart as arterial blood. We are assuming, of course, that there is a sufficient area of normal lung to accomplish complete oxygenation. If some blood filters through the consolidated portion it will emerge unchanged, and will therefore color the arterial stream and cause cyanosis. The more blood that passes through, the deeper will be the cyanosis. The deepening cyanosis, therefore, in the case of an infarct, is evidence of recovery, that is, restitution of circulation, and not, as in pneumonic consolidation, of more extensive pathology. Cough and expectoration, along with enzymatic and absorptive processes, gradually clear the bronchioles of the obstructing coagulum. As this is accomplished air can again reach the alveoli. The cyanosis then gradually clears. In other words the process is as follows: In a medium-sized infarction a branch of the pulmonary artery is occluded. This leads to infiltration with blood of the area supplied by the artery. Clotted blood fills both alveoli and bronchioles. By gradual re-establishment of collateral circulation venous blood again begins to flow through the infarcted substance, and, returning to the heart as venous blood, causes cyanosis. Clearing of the alveolar spaces and bronchioles then lightens and removes the cyanotic tint by re-establishing respiration.

Deep cyanosis developing subsequent to a medium-sized infarction does not necessarily indicate a bad prognosis, provided there is no cardiac dilatation, or reflex disturbance of heart action and

marked hypotension, which contributes to the cyanosis. Rather, it indicates a reparative process, and is evidence of recovery.

*Case 3.*—Postoperative embolism. Mrs. A. N., aged 25, was operated for bilateral pyosalpinx and ovarian cystadenomata, with implantations on the sigmoid and in the posterior cul-de-sac. Both ovaries and tubes were removed. The patient was recovering nicely, with a daily temperature of 99 to 100, when on the seventh day she suddenly sat up in bed, dyspneic, and complained of a sharp pain in the chest. She could not definitely localize the pain. She appeared pale and very anxious, and began to perspire profusely. The pulse was weak and rapid, and the temperature shot up to 103. Examination of the chest showed a questionable slight dullness over the left base posteriorly. She developed a cough, but raised little sputum, which was never bloody. In twenty-four hours she felt much easier. The fever dropped gradually, and she went home on the twenty-second day with no abnormal chest findings. Our diagnosis was that she had had a small embolus from the deep pelvic veins, which never caused a demonstrable infarct, pleurisy, nor hemoptysis.

*Case 4.*—Postoperative embolism. Mr. H. T., aged 43, was operated under local anesthesia for left inguinal hernia. Following the operation he had a daily, unexplained, afternoon temperature of 99 to 100. Pulse and respirations were normal. On the second day he began to complain of vague abdominal pains. The abdomen remained moderately distended, and repeated enemata gave but little relief. He vomited repeatedly, and refused food. He had daily loose bowel movements. On the sixth and seventh days he felt somewhat easier, but on the eighth day he complained of a sudden sharp stabbing pain in the right paravertebral region, at the level of the eleventh thoracic spine. Temperature 98.3; pulse 90; respiration 26. I was able to find absolutely no physical signs of trouble in the chest, but because of the sudden onset of the pain, and the location in the right base, suspected a small embolus. The persistent abdominal distress and daily slight fever supported the supposition of a hidden thrombophlebitis. On the twelfth day the temperature reached 101.4, pulse 88, respiration 32. Breathing was catchy, with pain on deep inspiration. Definite dullness with distant breath sounds was found in a triangular area at the extreme right base. These developments confirmed the diagnosis of a small infarct in the right base, with an overlying pleurisy to explain the pain.

In three days the temperature, pulse, and respirations had returned to normal, and the patient was discharged feeling well. An impairment of resonance was still demonstrable over the infarct, but breath sounds were becoming audible. Two weeks later the condition had entirely cleared up.

*Case 5.*—Puerperal embolism. Mrs. R. J., aged 45, in a normal labor gave birth to her sixth child. She had been troubled during all her pregnancies by tortuous varicosities in both legs. Twelve days postpartum she developed a superficial thrombophlebitis on the medial aspect of the right thigh. There was pain, inguinal adenitis, and a red streak running down the thigh, which palpation showed to be a very tender thrombosed vein. Temperature 97; pulse 94. She also had large, protruding, painful thrombotic hemorrhoids. We kept her in bed, the leg elevated and covered with hot compresses. The thrombotic process gradually spread down into the calf, but she was comfortable, and never showed a rise of temperature, until on the seventh day she complained of a sudden sticking pain below the left scapula, and the temperature rose to 99.2, pulse 110, respiration 28. There was impaired resonance below the inferior angle of the left scapula, with distant breath and voice sounds. Evidently a patch of pleurisy was present, but no friction rub could be heard. The temperature became normal the next day. In four days the sticking pain on inspiration had disappeared, and resonance and breath sounds were normal. There was never any cough nor sputum. Fifteen days after the onset of the phlebitis we got her out of bed, and she had no further trouble.

*Case 6.*—Puerperal embolism. Mrs. M. P., age 30. This case parallels Case 5. Four days after the birth of the second child a superficial phlebitis developed in the right thigh, and soon thereafter in the left leg. On the twentieth day a pain appeared low in the right axilla, to be followed on the twenty-first day by a similar pain below the left scapula, extending around to the precordium, accompanied by belching. Temperature 99.3; pulse 96; respiration 32. No physical signs appeared for two days. Then there was slight dullness and suppression of breath sounds in the base of the left lung. Turning in bed caused a catching pain in the left side, and violent coughing. There was no cyanosis, and no sputum. When the pain first appeared in the chest the patient remarked that the left leg felt better. Within a week temperature and pulse had dropped to normal, and recovery thereafter was uneventful.

*Case 7.*—Septic emboli in acute endocarditis. Mr. G. J., aged 24, had acute pharyngitis, which led to bacteremia and multiple arthritis. Blood culture showed a streptococcus. Endocarditis and myocarditis came next, to be followed in turn by a septic pneumonia, of sudden onset, which from day to day showed great variation in physical signs. There were several attacks of sudden chest pains, with collapse symptoms, followed later by patches of consolidation, and pink frothy sputnm. These attacks I believed to be caused by embolic thrombi from the heart, but the symptoms ascribable to embolism were difficult to evaluate because of the extreme myocardial damage and the pneumonia. In all probability the pneumonia itself was of embolic origin. Death came suddenly on the thirty-first day of the illness. Autopsy showed the presence of large fibrinous thrombi in all the heart chambers, warty vegetations on the aortic valve, a circular infarct in the anterior wall of the right ventricle, and multiple infarcts in both lungs.

Summary: Pulmonary embolism is of not infrequent occurrence. In the presence of known thrombosis, or when an unexplained slight postoperative fever suggests the possibility of hidden thrombosis, the development of embolism should be kept in mind. The distinctive feature in each

of the cases reported, which should suggest the diagnosis of embolism, was the very abrupt onset. Initial symptoms are: sudden anxiety and restlessness, with dyspnea, tachycardia, precordial oppression, persistent belching, and a shock-like state with rapid soft pulse, cold extremities, and profuse perspiration. In the course of several hours there follow pleuritic pain, fever, bloody sputum, and the appearance of a dull area in the chest, especially over the right lower lobe, with distant or absent breath sounds, and often a friction rub. The bronchial breathing and râles of pneumonic consolidation are lacking. Cyanosis is extreme in massive embolism.

BIBLIOGRAPHY

1. Wharton, L. R., and Pierson, J. W.: The minor forms of pulmonary embolism after abdominal operations. Jour. Am. Med. Assn., Dec. 2, 1922, lxxix, 1904.
2. Heard, J. E.: Postoperative pulmonary embolism. New Orleans Med. and Surg. Jour., 1924, lxxvi, 451.
3. Wilson, L. G.: Postoperative pulmonary embolism. Ann. Surg., 1912, lvi, 809.
4. Lindsay, E. C.: Prevention and treatment of postoperative pulmonary embolism. Lancet, Feb. 14, 1925, 327.
5. Magnus, G.: The site of origin of pulmonary emboli, and the significance of the saphenous vein in the process. Klin. Wchnschr., Jan. 22, 1924, iii, 142.
6. Hampton, H. H., and Wharton, L. R.: Venous thrombosis, pulmonary infarction, and embolism following gynecological operations. Bull. Johns Hopkins Hosp., April, 1920, xxxi, 95.
7. Haggart, G. E., and Walker, A. M.: Physiology of pulmonary embolism as disclosed by quantitative occlusion of the pulmonary artery. Arch. Surg., May, 1923, vi, 764.
8. Karsner, H. T., and Ash, J. E.: Experimental bland infarction of the lung. Jour. Med. Research, 1912, xxii, 205.
9. Virchow, R.: Quoted in MacCallum's Textbook of Pathology. W. B. Saunders & Co., 1916, 31.
10. Mann, F. C.: Pulmonary embolism. An experimental study. Jour. Exper. Med., Sept. 1, 1917, xxvi, 387

The Principles of Ethics of the American Medical Association begins with these words, "A profession has for its prime object the service it can render humanity." We have a glorious record of service to humanity in the past. The aspect of our profession, and of civilization in general, has changed more in the past fifty years than in all previous history, and it is necessary that we examine carefully to see whether we have so applied our present knowledge that we may render the greatest possible service. We will have the full confidence and support of the American people when we convince them that we are in earnest about health examinations and health conservation. We can't do this work in an old-fashioned, amateur way. We must form a modern, efficient, broad-gage organization. — E. B. Edie, M.D., *A. M. A. Bulletin.*

# CAUSES OF DEATH IN DIABETES MELLITUS*

ARCHIE H. BEARD, M.D.
Assistant Professor of Medicine, University of Minnesota
*Minneapolis*

In order to compare the causes of death in diabetes before and after the introduction of insulin, we have reviewed and checked the cases in the University Hospital and in private practice since 1916. The records of the Dispensary are not complete during the war period, and for that reason are not included.

We have divided the cases into two groups. The first includes all cases entering the hospital up to March 1, 1923, when the use of Iletin began. The second group includes all cases entering the hospital since Iletin has been used. A few cases did not receive Iletin, but have been reported in order to give a more accurate report over a two-year period. No cases since March 1, 1925, are included.

Beginning in September, 1916, 179 cases in the first group were seen. Of this number, 28 died in the hospital. The mortality varies between 0 and 33 per cent per year. This does not mean that the treatment varied. All cases were under the same regime, that is, the treatment outlined by Joslin. During the last five years the yearly mortality has been nearly stationary. This is interesting when we consider the irregularity with which severe or mild cases, with and without complications, may enter the hospital.

The causes of death in the various years are of interest, and are as follows:

1916: Cardio-vascular disease, one; cerebral hemorrhage, one; acidosis, one.

1917: None died in the hospital.

1918: Tuberculosis, two; septicemia and carbuncle of leg, one each.

1919: Acidosis, four.

1920: Diabetic gangrene, one; acidosis, five; angina, one; following prostatectomy, one.

1921: Acidosis, five; tuberculosis, two; gangrene of leg, one.

1922: Acidosis, four.

Of the cases that died in acidosis during 1920 and 1921, 50 per cent were severe cases of 1918 and 1919 which had been under treatment for one

*From the Metabolic Service of the Medical Department, Medical School, University of Minnesota.

or two years, and had become so severe that they could not be kept sugar-free on various diets; malnutrition developed, and acidosis increased gradually. It would be most interesting to have these cases for treatment today. We all realize that we are not seeing the extreme cases of the earlier periods resulting from prolonged starvation.

In all cases a complete history and physical examination were made and the necessary laboratory work to complete our records was done. Of the 179 cases, a positive Wassermann was unusual, only four receiving luetic treatment. Every case of death from acidosis showed an increased white blood count, from 10,000 to 28,000. Each case autopsied of this number showed bronchopneumonia. The diagnosis of bronchopneumonia was made clinically in many other cases, where autopsies were not performed. Secondary anemia was unusual in the uncomplicated cases. This corresponds closely with the report of Fitz and Murphy from the Peter Bent Brigham Hospital.

Our conclusions, therefore, are that of the twenty-eight cases dying in the hospital, nineteen died of acidosis, three of tuberculosis, two from gangrene of the leg, one of angina, one cardiovascular, one carbuncle, and one with uremia following an operation for prostatectomy. In other words, coma was the greatest cause, and bears out the old statement that acidosis caused about 75 per cent of the deaths before the use of Iletin. The other causes, except tuberculosis, can be included in the general group of cardiovascular diseases. Coma uncomplicated by terminal infection was rare. Secondary anemia was rare. Leukocytosis was generally found in all cases, and syphilitic infection was unusual.

In 1922, because of the interest as to the results after patients left our care, the 179 patients were traced, and the following mortalities are reported:

| Years | Mortality Percentage |
|---|---|
| 1916-1923 | 83 |
| 1917-1923 | 60 |
| 1918-1923 | 66 |
| 1919-1923 | 38 |
| 1920-1923 | 42 |
| 1921-1923 | 30 |
| 1922-1923 | 7 |

Average mortality, 22 per cent.

This again shows the small value of statistics, for, naturally, with increasing age in the older patients, we could not expect decreasing mortality. We can assume that the 7 per cent mortality of 1922 would have increased rapidly by the time this report was completed if Iletin had not been used. Our yearly statistics from the hospital, therefore, seem to be of more real value in comparing the results before and after the introduction of Iletin.

Since March 1, 1923, 116 new cases of diabetes have been treated in the University Hospital and in private practice. In this series, there have been seven deaths, two from acidosis, one cardiovascular, three following the amputation of gangrenous lower extremities, and one following cholecystectomy. One left the hospital after amputation for gangrene of both legs had been advised. The mortality over this two-year period is approximately 7 per cent. The interesting feature is a contrast between the causes of death in the two groups. Whereas acidosis caused the greatest number of deaths up to 1923, complications such as gangrene or secondary infection cause the greatest number now. Carbuncle does not enter into this small series, and although tuberculosis has been present in about the same proportion of the cases under Iletin treatment, we seem to be showing better results. We realize that the annual mortality in the new series is of little value in drawing conclusions, but certainly we are seeing fewer cases of coma, and more of cardiovascular complications.

In this group of 116 cases, twelve were operative, seven having amputation for arteriosclerotic gangrene, four cholecystitis, one acute appendix, and one squamous carcinoma of the submaxillary gland. A few others had minor operations, such as cataract extractions. A great many others had generalized cardiovascular diseases with arteriosclerosis of various grades, but are placed in the general group, and were treated medically. It seems that we can safely report a lower mortality in the new cases than during the preceding six years. Acidosis as the cause of mortality is rapidly decreasing.

In reviewing the causes of death in this disease, there are many lessons to be learned. In view of the fact that coma seems to be closely associated with infections, it is of the greatest importance that we watch for this possibility in all diabetic individuals. This is especially true of young people, who seem more prone to develop acidosis than the older people. The prevention of coma and acidosis rests primarily upon the doctor's training of his patients in the technic of diets. By careful diet they may more easily keep the urine free from sugar and diacetic acid. Care for the smallest ail-

ment is essential, and symptoms should be reported to the doctor immediately. It is necessary that patients appreciate necessary changes in their diet at this time, and that they rely upon forced fluid and orange juice when anything unusual occurs.

After coma has developed and the physician has been called, the case has become a medical problem. The routine to be carried out is not to be covered in this paper, but complete studies and close observation of the case are necessary. Under Iletin treatment, it is the unusual and severe cases entering the hospital before the physician has an opportunity to institute his treatment that probably will be lost. It is important to remember that during coma the patient usually requires a great deal more Iletin than under normal conditions, and the physician must ignore the amount of glycosuria that may occur temporarily if he can control the acidosis.

Sepsis of various kinds must be watched for carefully, such as acute respiratory diseases, tonsillar, dental, skin, and intestinal infections. Over long periods of time they lower the carbohydrate tolerance. If overwork, worry, and improper exposure to cold and dampness are added, the mortality is greatly increased.

Unfortunately, in older people cardio-renal diseases have to be considered along with arteriosclerotic gangrene and infection. Fortunately, in the elderly patient, acidosis is more slow in developing, and we have a better chance to watch for it. These cases usually become a general medical problem with renal disturbance and myocardial weakness. After gangrene has once occurred, it is a divided responsibility between the surgeon and the physician. Gangrene should rarely occur in the patient under treatment. The preventive treatment as instituted by Joslin should be carried out painstakingly.

In summarizing, we may say that in the past there were four common causes of death: (1) coma, (2) sepsis, (3) pulmonary tuberculosis, (4) gangrene, including cardiovascular diseases. Today we have the order reversed, the greater number of deaths being due to cardio-vascular diseases. As a result, many such cases can be prevented or postponed by the proper education of the patient. It is the unusual case in acidosis that the physician does not see early enough that is lost. The responsibility of the doctor rests in the early detection of typical symptoms and laboratory findings of acidosis.

## LEGAL POINTERS

W. H. Oppenheimer
*St. Paul*

Malpractice cases divide themselves into three general classes—

1. Those where (the facts being undisputed) the issue is whether or not the physician or surgeon followed the usual and customary practice of physicians and surgeons in good standing in his community in like cases.

2. Those where there is a dispute as to the facts surrounding—

(a) The propriety of the treatment given;

(b) The treatment actually given; in other words, what did the doctor actually do?

(c) The result; in other words, the true "before and after" picture.

3. Those few cases where it is claimed that the doctor guaranteed or contracted to effect a cure or some other result.

The first class deals with the competency of the doctor involved. The "do" or the "don't" lies in his medical knowledge or skill, and for this reason is eliminated from further discussion here. The third is a matter of contract and is likewise not discussed.

The large majority of malpractice cases fall in the second class, and, contrary to the common impression, these cases are nearly always determined in the courts, not from a medical aspect, but upon issues of fact.

To illustrate, the writer recently defended a doctor against alleged malpractice in performing a bone graft on a fractured tibia. The question of the propriety of the operation was involved. The doctor testified, and his history card and the hospital record confirmed his testimony, that the patient told the doctor he had sustained a fracture of the tibia about one year before; malunion had resulted; that the patient's leg began to hurt after walking a block or two, and the more he used it the more it pained, and that he could not work. *X*-rays and physical examination confirmed the previous fracture and malunion. On the stand the plaintiff (his wife and other witnesses corroborating) admitted the fracture the year previous, but stated that he told the doctor that when he got up

in the morning his leg pained but after walking a block or two the pain ceased; that he was capable of performing, and actually did perform, heavy work as a laborer without pain or inconvenience. Defendant readily admitted that if the plaintiff's story was true, he should not have performed the operation; the medical testimony even of plaintiff's own doctors was such that the court charged the jury (on this issue) that if the doctor's statement of what the patient told him was true, it must return a verdict for the doctor on this issue. In other words, the propriety of the operation depended, not on the testimony of doctors, but on the truth or falsity of plaintiff's story on the stand as to what he told the doctor.

This illustrates the point of this article, namely, despite all the medical testimony found in the average malpractice case, the final decision usually rests on a question of fact independent of such medical testimony.

Every doctor knows how a very slight change in facts may completely alter a case from a medical standpoint. But what every doctor does not realize is that protection from malpractice cases rests fully as much in assuring a stable state of facts as in medical competency.

A few general observations may be helpful.

It is axiomatic that an honest mistake of judgment in diagnosing a case is not malpractice; the doctor is not liable for a mere error of judgment provided he does what he thinks is best after a careful examination; but, as stated, the mistake must be one of judgment and not of conditions; of facts, if you will, upon which the judgment is based and which are ascertainable by methods usually employed by competent doctors. What story did the patient tell the doctor? What investigation did the doctor make to ascertain the facts? A slight variance in the facts when recited in the court room may, unless successfully contradicted, result in a verdict against the doctor.

As has been well said by the Supreme Court* of the State of Minnesota—

"The basis of the proof of negligence and of the hypothetical questions to plaintiff's experts is naturally the narrative of the family or friends of the patient. Their testimony must ordinarily be unsatisfactory because of the presence of natural bias, the absence of technical knowledge essential to proper observation, and often the want of opportunity for actual perception, as will presently appear in this case. 'The physician,' said Judge Upton, 'is liable to have his acts misjudged, his motives suspected, and the truth colored or distorted, even where there are no dishonest intentions on the part of his accusers. And from the very nature of his duty, he is liable constantly to be called upon to perform the most critical operations in the presence of persons united in interest and sympathy by the ties of family, where he may be the only witness in his own behalf.'"

*Staloch v. Holm, 100 Minn. 276.

All this is particularly true where a doctor on examination finds but slight chance of a complete recovery yet must proceed on the chance that he may be able to accomplish what is, to the doctor at least, the unexpected. The patient must help, of course, so he is cheered up and matters explained in the most hopeful manner. Favorable recovery failing, the result is contrasted with the doctor's hopeful statements. The patient is disappointed and dissatisfied, and begins to work out in his own imagination the reasons for the failure to cure. Imagination assists him in coming to the conclusion that the doctor has not properly treated his case. In time this becomes a conviction on the part of the patient, and the latter, his relatives and friends begin to discuss what the doctor did or did not do, and endeavor to find something to support their conviction, namely, that the doctor was guilty of malpractice. Discussion continues and an attorney is consulted and given the facts which have grown up in the imaginations and minds of the patient, his relatives and friends, and a suit is started. The doctor in the meantime has gone about administering to other patients, this being one of many cases. He has forgotten the details, he has no records, and even if he does happen to remember the details of the case, he has no one to support them, whereas the plaintiff is supported by all those who are peculiarly interested and biased.

Illustrations and arguments might be multiplied, but they would all lead to one conclusion, namely, the doctor must be prepared to defend himself not only as to medical ability, but as to the facts of the case.

How can this be done? The following "do's" and "don'ts" may be helpful:

DO'S

*First.*—Get the habit of keeping records, and, above all, *complete* records. A poor record is frequently worse than none at all.

*Reasons.*—Juries give great weight to records;

they are written as a rule before trouble appears and when there is no motive for misrepresentation.

Adding facts, though true, to a partial record, has all the appearances of adding an afterthought; of bolstering up one's case. Put yourself in the jury's place; such a situation ofttimes is disastrous.

The writer has often thought *where practicable* it might be well to have printed on the history card of the doctor and of the hospital a line, "the above history read to the patient and found correct," followed by a place for the signature of an office assistant, nurse or interne, and to have the history as written down read to the patient, acquiesced in by him, and that fact noted by the signature of such assistant.

"Printed," because then it appears usual; if not printed, if done only occasionally, the fact that it was done in a specific case raises the question "why?" in a jury's mind.

"Re-read," because, unless this is done, the patient can easily say he did not make the statement as written, and, not having seen it or had it read to him, did not know it was incorrectly transcribed.

"Re-read and signed" by an assistant, if practical, so as to provide another witness.

Above all, the records should be complete even to the point of negativing conditions and facts.

*Second.*—Personally examine hospital histories, charts, reports of operations, etc., and see that any inaccuracies or omissions are immediately corrected or inserted.

*Reasons.*—The profession would be startled to know how harmful inaccuracies in charts and reports (seemingly unimportant at the time) become in a lawsuit. They not only create a false atmosphere, but strike at the correctness, at the value to be placed on other portions of the chart as evidence.

*Third.* — Hospital charts and other (including office) records should, where practicable, show names of nurses, internes or assistants in attendance on the cases so as to assist in securing them as witnesses later.

*Reasons.*—Nurses, internes, assistants frequently move to distant places. In the course of a year or so it may be hard to identify a nurse from her handwriting on a chart. A space for insertion of names in the hospital chart would be helpful.

*Fourth.*—If a hint of trouble appears, secure and record names of witnesses.

*Reasons.*—In addition to that given above, let us suppose a patient is in a ward; how helpful it would be to have the names and addresses of other patients in the ward to testify to his complaints, suffering or other conditions!

*Fifth.*—Use the *x*-ray and save the pictures.

*Reasons.*—The *x*-ray is a record which, properly explained, is hard to disprove. Its value as evidence lies in its availability; hence it is to be preserved until all danger of litigation is passed.

*Sixth.*—In cases of serious deformity use a camera before treatment.

*Reasons.*—The hardest thing for a jury to understand is a bad result. They forget doctors are not insurers; and this is particularly true where the "before" condition is pictured by the plaintiff as being far better than the "after" condition.

How easy to say in the case of a serious deformity you want a picture to study the condition. How helpful when trouble comes to have a picture of the condition of the patient's nose, leg or other deformed member to correctly portray the real condition, and how helpful in convincing the jury of plaintiff's powers of exaggeration.

### DON'TS

*First.*—Don't be too optimistic in the presence of a patient or his relatives or friends; or, if you have to bolster up the patient's courage, be sure to explain privately to his relatives the true situation.

*Reasons.*—Most people are honest. Misunderstanding frequently starts thoughts, starts discussions that lead to trouble where, but for the misinterpretation placed on one's words or acts, no discussion would have taken place.

Remember that the layman does not stop to realize that a physician or surgeon does not deal with inanimate or insensate matter like a stone mason or bricklayer, who can choose his materials and adjust them according to mathematical lines. Laymen do not realize that the physician has a suffering human being to treat, a nervous system to tranquilize, and an excited will to regulate and control; and that the physician has not only to apply the known facts and theoretical knowledge of his science, but that he may have to contend with powers and hidden influences, such as want of vital force, habit of life, hereditary disease and the mental

state of his patient, all or any of which may render the management of a case difficult, doubtful and dangerous, and may have greater influence in the result than all the physician will be able to accomplish even with the best skill and care.

*Second.*—Never criticize, even *by inference*, another doctor's work without being absolutely sure you are justified in so doing.

*Reasons.*—You never can really grow by knocking the other fellow. You may not know all the facts; and, furthermore, the facts told you may not be correct.

The writer realizes the above is very sketchy. "Do's" and "Don'ts" might be multiplied, as might illustrations. The purpose is not to formulate a code, but to draw the thoughts of those interested to what is believed will be to some at least a new side to malpractice litigation. This accomplished, it will pay to give a little thought to one's own particular case, and see if one's "record of the facts" is as complete as one would like.

---

### CRIME, DELINQUENCY, AND DEPENDENCY

"Crime and delinquency are largely mental-hygiene problems and require the attention of the mental clinic just as mental and nervous disorders do. The studies made of juvenile and adult offenders show unmistakably what an excellent opportunity the clinic affords to help unsocial and maladjusted individuals in their mental and social reconstruction. They point, moreover, to the preventive work that would have been possible had the significance of their unsocial tendencies been recognized in early life. The nursery and kindergarten studies show that even very young children develop harmful mental and emotional habits and personality difficulties that have everything to do with the disorders and problems of youth and maturity and must be corrected early to avoid later serious trouble. * * *

"Dependency, too, and other forms of social inadequacy are frequently the result of poor social adjustment, even where there is no clear-cut mental disease or defect or organic deficiency, and the power to adjust satisfactorily to social conditions and to make the most of the opportunities that are available depends on the personality development that takes place during childhood and adolescence. Thirty per cent of the 366 problem children given special study in the public schools of Staten Island showed some maladjustment to social conditions that already was proving detrimental to educational and social efficiency, and many more showed abnormal personality trends."—Report on Mental Health Survey of Staten Island, National Committee of Mental Hygiene.

## FULL-TIME CLINICAL TEACHING*

E. P. Lyon, Ph.D., M.D.
Dean of the Medical School,
University of Minnesota
*Minneapolis*

The functions of a university are usually expressed under the two heads, teaching and research.

Teaching tends to divide itself into that adapted to general education, the undergraduate school, and that adapted to specialization, the graduate school. The Minnesota Medical School is an undergraduate school, but many of the medical school professors are also on the graduate school faculty. This fact needs to be kept in mind when one considers the type of man needed in medical school professorships.

The University tends to develop service enterprises such as dormitories, dining halls, shops and storehouses, university press, athletics, health service, dispensaries and hospitals. These are business undertakings, but justified as adjuncts to teaching and research. This needs to be kept in mind when considering the growth of the University's clinical facilities.

A medical school is not different fundamentally from any other college or school. It differs from others in detail,—just as agriculture differs in detail from mining,—because of the material handled in teaching and research. One part of this material in the case of a medical school is composed of sick human beings. These sick people must have medical care. This fact relates medical teaching to the practice of medicine. It cannot be otherwise—indeed, it ought not to be otherwise,—for the practice of medicine is the goal toward which the student of medicine is directed and for which the medical school in large measure exists.

The relation of the medical school to medical practice is one cause of the great interest manifested by medical practitioners in medical education. This interest is important and should be fostered. To be properly fostered it must be informed.

It should be valuable to all of us occasionally to look at the whole matter in historical perspective.

Medicine began as unrelated empirical facts—trial and error procedures, with a gradual selec-

---

*Read before the Hennepin County Medical Society, Nov. 2, 1925.

tion of those which proved to be useful. Medicine now has a scientific foundation, but medicine itself is not a science. It is an art based on science. Probably it will always be an art.

Medical teaching began as the handing on of medical knowledge from father to son, from preceptor to pupil. The great master tended to gather many pupils about him, and the school came into existence because of this fact.

At first each teacher taught all that was known, but gradually a differentiation was brought about. Anatomy for a long time tended to go with surgery. The physician, in contrast with the surgeon, was interested in medication, consequently in alchemy and its successor, chemistry, and in hygienic rules, to be based eventually on what we now call physiology. Gradually the basic sciences were evolved and differentiated from the practical procedures now supposedly based upon them, but largely, no doubt, of more ancient empirical origin.

Fifty years ago the prevailing type of medical school in this country was proprietary, that is, owned and conducted by the faculty. The prized chairs in the clinical branches were controlled by successful practitioners. Teaching and practice were carried on together. The scientific branches were usually taught not by professional scientists but by young practitioners, as stepping stones to the practical chairs.

Some called this an advantage; others, a disadvantage. The difference of opinion depended on point of view. Those who looked upon practice as chiefly an art or trade or system of technics would favor the practitioner-teacher. Those who believed that the art should be practiced from a scientific point of view and that progress in the art depended on scientific progress would favor more scientific teaching.

It is apparent that the latter view prevailed. The great progress made in the medical sciences in the last seventy-five years undoubtedly contributed to the now prevailing opinion that the sciences must be taught by men specially prepared in the sciences and not by physicians in practice. It came about therefore that the medical sciences were handed over to professional anatomists, chemists, bacteriologists and so on. These men had prepared themselves for their particular jobs and devoted all their time to them. They were called "full-time" men, meaning that they did not have any outside practice.

By the year 1900 all the medical schools were committed to the idea of full-time scientific departments. While one frequently hears that the teaching in these departments is "too scientific," or "not practical enough," I have never heard it seriously proposed that the professional anatomist be displaced by a practitioner of surgery, nor the physiologist by a man in internal medicine.

The decade from 1910 to 1920 was one of seething change in American medical education. By consolidation and elimination the number of schools was cut in half and practically all the survivors became university departments. All to the extent of their ability built up their science departments. At the same time the realization became increasingly acute that the practical branches could be adequately taught only when the student could be brought into intimate and supervised relation with the patient; and that the student, so far at least as the art is concerned, must "learn by doing." This meant a greater control of clinical material than the previous loose affiliation with private or public hospitals had permitted.

It was recognized that the hospital and dispensary are to the clinician what the laboratory is to the scientific worker. There came a demand for university hospitals, and for such relations with other hospitals as would give the university a free hand for teaching and research.

It is astonishing to what a degree this ideal has in a few years been realized. It is still more astonishing when one considers how intimately these changes are bound up with medical practice, and how ideals and even vested rights of practice have been accommodated to the change of medical education. The comparatively little friction involved in these changes speaks well for the open-mindedness of the medical profession.

All sorts of questions have been raised, such as state medicine, favoritism through university prestige, control of teaching institutions by cliques, etc. The wonder is not that a questioning attitude prevails among medical men, but rather that in such large majority they have been in favor of these progressive measures in medical education.

One further step was bound to be taken. If the anatomist's job is one demanding special prepara-

tion and the devotion of one's full time and energy, why should it be different in a department, let us say, of internal medicine? The amount of teaching is as great. The type of knowledge is as detailed and as important—perhaps more important—to the young practitioner. The needs for progress in knowledge are even more pressing for the sake of humanity. The full-time professor of medicine was envisaged as a university officer on a par with the mathematician, historian, physicist and physiologist.

But here important questions arise and demand an answer. Since medicine is a practical art and since medical men must serve the people in a practical way, is it safe and proper that the teacher of medicine be removed from actual practice? Is there a special psychology of teaching attached to those who daily meet the problems of sickness in the office or in the home? Does not the expert owe something to the public?

There are financial questions. How can the experienced and successful medical man who has spent years in his education and in building up his practice afford to give up his income for the more meager stipend of a university professor? How can the professor so supported afford to associate on equal terms with his colleagues in practice; or, more important, how can he afford the travel and study essential to keep abreast of the times?

It must be confessed that these questions are difficult and not answered with entire satisfaction. But some things can be said.

The first is that the need is so great that the effort must be made. The duties of a university professorship are man-size. With all good-will, energy, loyalty and ability, no man can do his best for either master when he serves two. I have absolutely no complaint against the able doctors who have worked diligently in season and out of season and often for years without compensation, for the University of Minnesota. I freely acknowledge that these men have built up a fine medical school. But I submit that what was found true for law and engineering is equally true for medicine. The medical school can only reach its fullest usefulness when its principal chairs are filled and directed by men whose sole thought is the university and whose sole functions in life are those of the university, namely, teaching and research.

In graduate work particularly I submit that guidance of beginners in advanced work, the outlining of research projects, the time-consuming instruction of individual advanced students can only be done by those who have time for scholarly pursuits and are on the job all day long.

Secondly, I think it is a mistake to assume that the best professor is the doctor who has made the greatest success in practice. The qualities which make the practitioner are not entirely the same as the qualities which make the teacher and investigator. Opera stars are not usually the best teachers of singing, nor great painters the best instructors in art.

Fortunately, with the gradual evolution of the full-time idea some young men have been attracted to and have prepared themselves for a university clinical career. Eventually, the steps to the clinical professorship will be the same as those in other branches,—the graduate school, the full-time instructorship, assistant professorship, and so on. The search for and choice of a professor in a clinical branch will follow the same principles as the search for and choice of a professor of mathematics or anatomy. I confidently expect to see this condition of affairs before my active life in education is finished.

Thirdly, I think it is demonstrable that the professor on full time should not be entirely separated from active contact with the profession to which he belongs and its work in the world. Indeed, a university does not isolate any of its faculty from such contacts as are valuable to them and to the community. The Board of Regents of the University of Minnesota has adopted general rules governing outside work carried on by members of the staff in any of the faculties and colleges. These apply with equal force in the Medical School.

The relation of the clinical professor to the public and to his practicing brethren is a special case, not a *de novo* problem. It is complicated by the very responsible relation which subsists between doctor and patient, which brooks often of no delay nor substitution. It is complicated by the personal nature of the service rendered and the peculiar psychology of medical practice. Nevertheless, it is a special case to be met by the application of general principles such as those set down in the regents' rules.

Fourthly, I think that practitioner-teachers will always be needed in medical schools. They will

be needed because they can contribute something special and important from their active experience; and they will be needed because of the necessity of doing much of the clinical teaching to small sections of students in hospital wards and in dispensaries, thus demanding a large staff of part-time teachers. My picture of an adequate department in a metropolitan school—let us say, in internal medicine—is a full-time nucleus consisting of the head, one or more additional professors or associate professors, several assistant professors, instructors and fellows, and around this nucleus a practitioner or part-time group helping to care for the patients in the hospitals and instructing sections of students assigned to them.

Fifthly, I think the change from the part-time to the full-time system should be brought about gradually and not by revolutionary methods.

We have been proceeding on this plan at the University of Minnesota for several years. Up to now we have a full-time professor of pediatrics, full-time associate professors of surgery, medicine and of neurology, a full-time assistant professor of psychiatry and several full-time instructors. With the cordial approval of the former heads who will remain with the school in part-time work we have just added a full-time head in medicine and are canvassing for a full-time head in surgery. We expect to develop these three departments to the best of our ability before going further with the full-time plan.

Before detailing the various full-time schemes which have been tried, let me say a word about what is meant by full time. I know there are those to whom it means, more than anything else, such a relation that the professor gets no outside income from his profession. To me it means nothing of the sort.

The professor of history may write historical novels and use the university library for the purpose. The professor of geology may act as consultant for a mining company. The professor of anatomy may write a text-book and the professor of bacteriology may prepare a vaccine for a physician. Each may use his laboratory and other facilities in doing this outside work. Even the Dean of the Medical School has been called upon on two or three occasions to "diagnose and prescribe" for a sick medical school and has collected a "fee" for his services!

To me, full time means the full devotion of one's time and energy to the university, with only such outside activities as contribute to one's growth or fulfill the expected duties of the university to the community. It is evident that those outside activities must be rigidly subordinated to the primary duties of teaching and research. It is evident that the clinical professor cannot be in practice in the same unrestricted way, either in time or place, as the regular practitioner. Full-time work in other words is synonomous with a university career. What we are seeking is to safeguard such a career and at the same time permit desirable contacts with individuals and with the general profession.

The first method of establishing a relation to private practice for the full-time clinical teacher, as just defined, is the consultation privilege. The professor does not assume control of the patient, but advises with the physician in control. This is the arrangement which the University of Minnesota made with the head of pediatrics and some other full-time men about two years ago. It was agreed that such consultations should never be carried on to the extent that would interfere with university work, and as a check on this possibility a monthly report of such consultations and the time consumed is made to the dean.

The arrangement has worked all right, but is not without objections. It takes the professor away from the school, and no students (not even graduates or interns) get any benefit. It would be better if consultations were restricted to the University Hospital. It may be doubted whether the consultation without opportunities for full study, with laboratory examinations, is very valuable to the development of the professor concerned. The arrangement, moreover, is hardly applicable, under existing customs in practice, to such branches as surgery and obstetrics.

The second arrangement is the Hopkins or Rockefeller Foundation full-time plan. The professor receives a comparatively large salary. He is not restricted as to the amount or kind of private work, but the fees for such service go to the university or hospital.

This system has proved satisfactory in some instances. It has been criticized, but for the most part only on theoretical grounds. It is not acceptable to many clinical teachers, and has been tried and rejected at Columbia.

Our University has not adopted this plan, but doubtless would do so in individual cases if the acceptable candidate preferred this arrangement to some other.

The third arrangement is the Harvard modification, or what I called some years ago the geographical full-time plan. The professor agrees to do all his work at the university hospital. Beds are made available in which he may receive private patients, and he is permitted to collect his fees for such service in the regular way. The hospital makes the regular hospital charges.

Last summer I looked carefully into the operation of this system at the Peter Bent Brigham Hospital in Boston. There are about forty beds in the private pavilion. These are not assigned to particular individuals. On the contrary, vacant beds may be filled by any member of the staff, even down to those of instructor rank. In addition to hospital work, the members of the Brigham staff are permitted to consult outside.

The same arrangement as to beds for private patients holds at the Presbyterian Hospital, New York, for the clinicians of Columbia University. There are thirty-two beds in the private service, and a suite of examining rooms for the staff's private work is provided by the hospital. The nonmedical personnel (secretary and nurse) is supported by the staff itself. Consultation work outside, Dr. Palmer informed me, is strictly avoided, as being distracting and bound to prove destructive of the professor's academic usefulness.

The Harvard full-time plan is the one our University has entered into with the new professor of medicine. He will have his office and laboratory in the University Hospital and be permitted to see private patients there. A limited outside consultation privilege has also been accorded to this professor. It is expected that others will come under the same general arrangement.

No particular number of beds has so far been set aside in the University Hospital for the private patients of members of the full-time staff, but it is understood that the number will be limited.

The salaries so far arranged for full-time clinical teachers at the University of Minnesota are not larger than those paid elsewhere in the University. The proposal favored by me is that these professors be on the so-called "Class A" or twelve months' basis, instead of being paid for the academic year only. In our Medical School this arrangement is particularly desirable because the school carries on teaching throughout the four quarters.

We do not go so far as to say that the problem of full-time clinical teaching has been solved. Our steps so far are to be considered experimental and tentative. We acknowledge, what has been said so often, that the ultimate success of any plan depends on the men who carry it into operation.

We think the arrangements we have made are fair to the medical profession. We think we have preserved, for our full-time men, necessary contacts with the public and desirable relations with the profession, and at the same time safeguarded the University. We shall be glad to have this system submitted to observation through a sufficient trial period, and shall court constructive criticism.

## FEWER PEOPLE DIE OF "OLD AGE"

Forty years ago, almost 5,000 deaths in the State (New York) were attributed to "old age." Last year the number of deaths so classified was only 610, a decrease of almost 90 per cent. The number of deaths from all causes has increased 75 per cent in this period of time. What is the reason for the astonishing decrease in mortality from "old age"?

Most of these deaths fall in the age group "70 years and over," although some deaths are attributed to senility at earlier ages, occasionally even in early middle life. The population of the State has doubled and the number of old people has more than doubled since 1885. The decrease in the number of deaths from old age is, therefore, not due to a shrinking in the contingent of the population from which these deaths are drawn. The reason for this change lies in the more careful and scientific diagnosis of the cause of death. Where forty years ago, the death of an old person, because of indifferent reporting or for want of knowledge, was often attributed simply to the effects of old age, now an effort is made to establish a definite diagnosis in every case. The progressive reduction in deaths under this head marks the growing skill and attention on the part of the practicing physicians of the State.—*Health News*, March 8, 1926.

# PUBLIC HEALTH IN MINNESOTA*

O. E. LOCKEN, M.D.
*Crookston, Minn.*

Public health is a term much used, but little understood. The achievements in the prevention of disease and the prolongation of the average length of human life are as fascinating stories of progress as the development of modern industry itself. However, the rank and file of citizens, as even a large part of the medical profession, are not aware that this nation is committed to an intensive ever-increasing development of state and municipal control of the problems of public health.

Let us review a panorama of the organization of Public Health, as it stands today in Minnesota:

1. The state maintains a Board of Health which is the executive force controlling the field with its various departments of Records, Vital Statistics, Sanitation, Preventable Diseases, Venereal Diseases, and Child Hygiene.

2. The state maintains a general hospital at the University which accepts free and pay patients through an interlocking responsibility with the commissioners of all the counties.

3. The state provides a hospital for crippled children at Phalen Park and is undertaking more extensive activities as a result of the Eustis and Dowling endowments.

4. The state provides a tuberculosis sanitarium and, together with the several counties, maintains fourteen county sanatoria for tuberculosis for both free and pay patients.

5. The state, aided by private endowment, has recently opened special cancer and eye, ear, nose and throat hospitals on its campus at the University and the demand is pressing for a similar institute for psychiatry.

6. The state maintains tremendous hospitals for the mentally defective.

Certainly the state is committed to the business of public health on a wholesale basis.

Let us go further and consider what the average municipality is adding to this effort in the interest of public health:

1. The local health officer is responsible primarily for the control of contagious disease by well regulated quarantine measures and the following of contact cases, and is or should be actively stimulating all activities which promote better public health in the community.

2. The school nurse checks all absences and questionable illness in the school in an effort to eliminate every suspicious contagious case from contact with others and to prevent the return to school before recovery is complete. In this capacity she is a most valuable aid to the local health officer. The influence of a school nurse in health education is, of course, a large part of her contribution.

3. Ordinances of sanitation, among which are:

(a) Pure water supplies made possible by prevention of contamination, by filtration, and by chlorine treatment.

(b) Pure milk from clean dairies, properly handled in bottles, and a careful tuberculin testing of all cows.

(c) Proper sewage disposal, and the inspection of privies and cesspools.

(d) A municipal system of garbage collection and disposal.

(e) Sanitary inspectors to check the establishments dealing with food supplies and to enforce ordinances which particularly relate to nuisances.

4. A Department of Physical Education in the schools supervised by a special director emphasizing development exercises, good posture, and athletics.

5. Supervised public playgrounds under the direction of trained directors, to get the maximum health development in the right environment.

6. Municipal swimming pools built on correct engineering principles to provide clean water for the safety of the children.

7. Medical supervision of school children providing annual physical examination, calling attention to the physical defects which are acting as handicaps to progress in school advancement. Under this division we find increasing tendencies to free vaccination against smallpox and diphtheria and to free administration of iodine as a prevention of goiter.

Certainly, if the state is committed to the business of public health on a wholesale basis, the municipality is committed to that same business on a retail basis.

But this is not all, for people with further vision to serve, where the state and municipality have failed, have created great general welfare agencies.

*Presidential address before the 24th annual session of the Minnesota State Sanitary Conference, St. Paul, November 5, 1925.

Among these the following are of special importance:

1. The Minnesota Public Health Association maintained by the sale of Christmas seals, founded primarily for the purpose of leading the fight against tuberculosis, is now spreading its activities in health education to all the problems of physical fitness.

2. The Red Cross, originally of importance only in times of disaster, expanding as a result of the needs of the World War, has undertaken extensive public health supervision and has made its greatest contribution in Minnesota by the maintenance of county public health nurses.

3. The Public Health Nurses Association draws its membership from a total of 334 nurses actively engaged in this field of socialized medicine in Minnesota. Of this number, 210 are in the three large cities and 124 in the rest of the state instructing and guiding the public in its problems of individual and community health.

If the state and municipality are engaged in the business of public health as the wholesale and retail divisions, then these agencies of general welfare represent the departments of advertising and the salesmen on the road. Their business, while they do give excellent special service, is primarily to create further demands from the buying public to expect an ever-increasing output of the finished product of improved methods of public health from the manufacturing plants of the government of the state and the municipality.

What is the significance of this paternalistic and altruistic tendency in disease control? No thinking man can suppose there will be any backward step in the development of this great scheme of supervision of public health. We can no longer call these activities of public health socialistic or bolshevistic. The demand for them is imperative and will continue to increase in the future as it has in the past.

It is of particular interest to review the success of this business of public health as we read the records from the reports of vital statistics.

What conclusions can we logically make from these figures?

The reduction in the mortality of typhoid fever has been made not through superior diagnosis or treatment, but principally through provision of pure water and pure milk. The reduction in diphtheria mortality has been accomplished by the free distribution of antitoxin to every community and by the establishment of laboratories for culture diagnosis and quarantine control. The Schick test for susceptibility, toxin-antitoxin for prevention and antitoxin for treatment should reduce the figure of 217 deaths in 1924 from diphtheria in Minnesota. The decrease in the death rate from tuberculosis of 50 per cent in twenty years is the greatest monument imaginable to the vision and constant

TABLE I

Important Diseases with Decreasing Death Rates
Per 100,000

| Disease— | Year | U. S. Rate | Minn. Rate |
|---|---|---|---|
| Typhoid Fever | 1900 | 39.9 | |
| | 1910 | 22.8 | 32.1 |
| | 1920 | 7.6 | 3.0 |
| | 1924 | | 1.46 |
| Diphtheria | 1900 | 43.3 | |
| | 1910 | 21.1 | 26.1 |
| | 1920 | 15.4 | 10.3 |
| | 1924 | | 8.57 |
| Tuberculosis | 1900 | 201.9 | |
| | 1910 | 154.9 | 109.0 |
| | 1920 | 113.2 | 89.5 |
| | 1924 | | 67.39 |
| Diarrhea and Enteritis (under two years) | 1900 | 108.8 | |
| | 1910 | 98.8 | 64.4 |
| | 1920 | 43.3 | 21.0 |
| | 1924 | | 11.77 |
| Pneumonia | 1900 | 180.5 | |
| | 1910 | 100.4 | 86.7 |
| | 1920 | 138.7 | 89.0 |
| | 1924 | | 70.55 |

efforts of the leaders in public health in Minnesota. Enteritis in children under two years of age, once a serious menace, has succumbed to pure milk and anti-fly campaigns. Pneumonia incidence decreases as the hygienic habits of living and industry are improved and the common cold is treated intelligently.

These statistics prove, if nothing else, that the balance sheet of the business of Public Health in the state of Minnesota is a credit to the organization, and the dividends to the people of the state represent a high percentage rate on the investment. A business so highly organized, so capable of such an excellent finished product as this balance sheet

reveals, will not be contented merely to carry on in the pathways of the past. New fields must be opened and new problems created for an expanding personnel to conquer.

Two paramount problems challenge the field of public health in Minnesota today. Each requires a different method of attack and a solution of either can be possible only by a more intensive campaign of public co-operation than has yet been attempted.

The first of these is the challenge of the diseases with increasing death rates which the rank and file of the medical profession must attack from a new viewpoint.

TABLE II

Important Diseases with Increasing Death Rate
Per 100,000

| Disease— | Year | U. S. Rate | Minn. Rate |
|---|---|---|---|
| Scarlet Fever | 1900 | 10.2 | |
| | 1910 | 11.7 | 14.5 |
| | 1920 | 12.5 | 4.8 |
| | 1924 | | 8.17 |
| Nephritis | 1900 | 89.0 | |
| | 1910 | 111.4 | 70.9 |
| | 1920 | 103.4 | 83.3 |
| | 1924 | | 58.34 |
| Cerebral Hemorrhage, Apoplexy | 1900 | 67.5 | |
| | 1910 | 75.9 | 42.6 |
| | 1920 | 81.0 | 60.1 |
| | 1924 | | |
| Heart Disease | 1900 | 123.1 | |
| | 1910 | 142.3 | 81.5 |
| | 1920 | 141.8 | 113.7 |
| | 1924 | | 135.69 |
| Cancer | 1900 | 63.0 | |
| | 1910 | 76.1 | 67.2 |
| | 1920 | 83.4 | 95.4 |
| | 1924 | | 101.04 |

Here we have had no assistance from public health education, or propaganda, state subsidy, or altruistic agencies. Scarlet fever, through the brilliant achievements of the Dicks and others, will soon take its place in Table I, depending largely on how active an interest the profession takes in the use of the established means of its prevention among the proven susceptibles. In spite of our scientific achievements in pathology, immunology and physiology, the ghosts of nephritis, cerebral hemorrhage, heart disease, and cancer go marching on without apparent hindrance. The helplessness of our present methods of combating these diseases is apparent.

A new conviction has developed, and the leaders of the American Medical Association have begun a campaign to enlist the interest of the medical profession and the public in the latest weapon against disease—the periodic medical or physical examination. Early recognition of defects and early institution of treatment, factors which have proven so effective in the warfare against tuberculosis, are now to be used against nephritis, hypertension, cardiac disease and apoplexy, just as they are already being used in the fight against cancer by the National Cancer association. The possibilities of this new viewpoint are as great as we have the energy to make them. The medical profession cannot be successful alone in this effort to educate the public. All public health activities must fall into line in a new movement of mass education, with maximum health from babyhood to old age, as the chief objective.

The second paramount problem of public health is the inequality of health education and health service in the various levels of society and units of government. There has rapidly developed in the last decade a vast gulf between the methods and results of health supervision in the rural, as compared with the city life of our state. In spite of general state regulations, there is no uniformity of protection from contagious diseases in the country, as compared to the city. There is no uniformity of opportunity for the country boy and girl to grow up in the knowledge of the principles of preventive medicine, which is offered to the boy and girl living in the average progressive city. As an evidence of the total lack of uniformity in the machinery of health administration in Minnesota, consider the survey that was made last year by the State Board of Health in a questionnaire sent to all health officers. Here is a summary of the facts ascertained:

Of eighty-seven counties, only four reported paying an annual salary for a county health officer, ranging from $50 to $600 a year. Only seven counties report keeping permanent records of communicable diseases.

Of ninety cities only forty-one report paying annual salaries, the great majority ranging from $25 to $350 per year. Only nine pay above $500. Permanent records are kept in only thirty cities.

Of 635 villages, 109 report paying some salary ranging from $10 a year to a fee basis per case. Only seventy-three report the keeping of permanent records.

There are 1,961 townships. Of those reporting, seven pay an annual salary of $8.00 and $15.00, 108 pay on a varying rate of mileage basis, four on flat rate of from $1.00 to $5.00 per case.

Only fifty-two townships report keeping permanent records of contagious diseases.

These figures show a complete lack of system and co-ordination of effort. The greatest weakness lies in the small town, village and township. An almost universal criticism was received against the ineffectiveness of the local boards of health in the townships and villages and the lack of power of county health officers.

So much for the present machinery of public health in Minnesota. We rightly ask what has been its results? Dr. Charles Mayo, within the last year, stated in a public address that the city youth today is healthier than his country cousin. The army draft of the world war indicated a greater percentage of defective young men from the strictly rural population than from the cities. A survey last year in the University of Minnesota, by Dr. Diehl, analyzing 3,478 physical examinations of male students, showed a much higher percentage of physical defects in students coming from rural communities than from the cities with a population above 50,000. In recent years the death rate of the city of New York with all its slums has been lower than the death rate in rural New York. In 1921, for the first time in the history of accurate statistics in the United States, we find a higher death rate for babies under one year of age in rural America as compared with urban America. In a survey of the United States Public Health Service of vital statistics in the registration area of the United States, if the rural districts had made the same progress in disease prevention during the last 20 years, as has been made by the cities, 35,000 lives would be saved annually. Is it not apparent that new machinery in keeping with changed conditions of modern life is necessary if the children in the villages and rural communities are to have their equal opportunity to grow up in the security of good health.

As a solution for the failure of rural America to be supplied with adequate health information and protection, a new movement has developed in eastern and southern states under the influence of the International Health Board co-operating with the United States Public Health Service in establishing full time county health organizations capable of carrying into the remote rural communities all the service of modern health education. An effort last year to permit such an organization to be established in Minnesota to take the place of the present inadequate township system of health supervision, failed in the last legislature, because of a lack of preliminary education of the public to the problem, a lack of organization to present it properly, and an indifference of the legislature to its need. Supervision of rural school education by a county superintendent of schools is considered a necessity. Supervision of law enforcement in rural districts by a county sheriff and a county attorney is accepted as a fundamental necessity. Minnesota has pulled itself out of the mud by abandoning the old poll tax system of building roads in the isolated units of township administration and centralized that work in a county and state system of connecting and co-ordinating highways to the great advantage of everyone. The day cannot be far distant when we will wake up to the realization of the value of establishing health supervision in rural Minnesota by giving to county health officers power and responsibility to guard the public in health matters, as it is now supervised in education, law enforcement and road building. Minnesota will take its place among the forward moving states when the public learns the value of these health measures, for then the public will demand for itself what it is failing to receive. This sanitary conference could do nothing greater than to make the accomplishment of this purpose its main objective.

In reviewing this remarkable development of public health in Minnesota, a vision of the future is most appealing. The very nature of the problems which face us has made the name of this organization, "The Sanitary Conference," an outdated title. The problems of sanitation have largely been solved. The possibilities of that larger term, Public Health, have ever been increasing. The viewpoint of this paper suggests that we acquire a new name—The State Public Health Conference. In so doing, it is further suggested that in the future this conference be a great joint meeting of the health officers of the state, the members of the Public Health Nurses Association, the delegates of the Minnesota Public Health Association, the members in the Physical Education Section of the Minnesota

Education Association, and of any other groups of welfare agencies which can contribute benefits by actively participating in such a joint session. Section meetings of these groups and a well balanced joint program should offer the greatest opportunity of combined effort for an early solution of these important problems of public health. Working at tangents under the present methods is a duplication of effort, inefficient and expensive. Combining our powers is in itself an inspiration to successful achievement.

A challenge is offered to the officers of the coming year to make this union of public health agencies a reality in the holding of a great combined State Public Health Conference a year from today.

## A CATALOG OF "CURES"

A marvelous category of alleged cures for this common ailment (poison ivy) of the links, the field, the footpath, and the park has been collected by the Minnesota investigator, Dr. E. D. Brown. Here are some of the things people have sworn by as cures:

Lime water and olive oil in equal parts.
Bruised leaves of belladonna mixed with fresh cream.
Tincture of chloride of iron.
Spirits of turpentine.
Hydrogen dioxide.
Brine from pickled fish.
A boiled decoction of cup oak bark.
Potassium chlorate.
Fluid extract of eupatorium.
Arsenic, taken internally.
Tincture of poison ivy *(Rhus Toxicodendron)* taken internally.
Coffee applied to the irritated spot.
Milk and cream poultices.
The swamp button bush, steeped in water.
Linseed oil mixed with lime water.

Of all these he merely comments that the ones that are applied externally and are irritants are more likely to be of some use than the others.—*Minnesota Chats*, Feb., 1926.

Measles is the most serious acute disease in existence. In the last twenty-five years, the total mortality due to diphtheria has fallen off in ten of the principal European countries by 67 per cent, scarlet fever mortality by 46 per cent, and whooping-cough by 43 per cent. Mortality from measles over the same period has fallen off only 10 per cent. It is so prevalent that hardly any one in any part of the world can hope to avoid it. The figures adduced recently by *The American Journal of Hygiene* go to show that more than 90 per cent of urban populations in England, Canada, and the United States contract measles at some period of their lives. In the whole of Europe, with the exception of Russia and the Balkans, measles caused 700,167 deaths in the ten years from 1900 to 1910. In the United States, in the zones subject to notification, measles has caused more than 100,000 deaths in the twenty years from 1901 to 1920. —*Literary Digest*, March 13, 1926.

## REQUIREMENTS FOR ADMISSION TO STATE AND COUNTY SANATORIA AND SANATORIUM SUPERVISION BY THE TUBERCULOSIS DIVISION OF THE DEPARTMENT OF PUBLIC INSTITUTIONS*

L. G. GUYER, M.D.
Executive Secretary, Tuberculosis Division, Department of Public Institutions
*St. Paul*

The advanced consumptive alone has a clear conception of what tuberculosis is as a disease. To him it means suffering, mental and physical. He feels and he more or less realizes that he is in the clutches of a foe who is trying to squeeze out his life and terminate his existence. To him it is a struggle and the foremost thought in his mind always is that he is grappling with an enemy. Whatever unnatural phenomena may arise in him and whatever changes may take place in his physiological functions and in his anatomical construction are merely indications to him of the victory of the enemy. In the same way and for the same reason amelioration of suffering and of discomfort are signs to him of victory.

What tuberculosis has meant to mankind and what it means even at the present day in suffering, in loss and interference with human happiness, is beyond the grasp of human mind. It has been the great scourge of all civilized peoples as far back as history records anything about human affairs. It is much less of an affliction now than it has been at any time in the past, though even now it claims many victims and levies a heavy tax upon man's happiness. The discovery of its cause and modern intimate knowledge of the life history of the tubercle bacillus bring it within the reach of human endeavor to wipe it out. All over the civilized world there is now an active campaign to accomplish this end and the results so far obtained give promise of ultimate victory.

And in this world-wide battle toward the eradication of the white plague the State of Minnesota is playing no small part.

In 1901, the legislature authorized the appointment by the Governor of an Advisory Commission, consisting of three physicians, for the purpose of investigating the advisability of establishing a State Sanatorium. The Commission rendered a full re-

*Read before the 24th annual session of the Minnesota State Sanitary Conference, St. Paul, November 5, 1925.

port of their investigation to the legislature of 1903. As a result of the report and recommendation, the 1903 legislature authorized the establishment of the State Sanatorium, "on property near Walker," and authorized the appointment of five physicians to serve on the Advisory Commission without remuneration, excepting expenses incident to their work.

Full power to manage, control and govern the State Sanatorium was placed under the State Board of Control. The duties of the Advisory Commission were limited to the approval of a site (near Walker, Cass County), approval of suitable plans, and the appointment in each county in the state of physicians to examine persons applying for admission. Such limited duties are still the functions of the Advisory Commission so far as the State Sanatorium is concerned.

However, the legislature of 1913 authorized the establishment of county sanatoria, appropriated one-half million dollars to assist counties in building and maintaining sanatoria and increased the duties of the Advisory Commission by placing this fund and its expenditure under the control of the Commission, which had the following membership: Dr. H. Longstreet Taylor, President, St. Paul; Dr. P. M. Hall, State Sanatorium, Ah-gwah-ching; Dr. C. L. Scofield, Benson; Dr. P. A. Smith, Faribault; Dr. Robinson Bosworth, now of Rockford, Illinois.

Dr. Taylor, of St. Paul, served as President of the Commission from 1901 until 1918. It is largely because of his vision and untiring efforts that Minnesota today possesses a system of tuberculosis hospitals unexcelled by any state in the Union.

This system of tuberculosis hospitals, or sanatoria, consists of one state sanatorium and fourteen county sanatoria. These institutions, their names, locations, the counties supporting them and capacity are listed in Table I.

Institutions, other than county sanatoria, which provide beds for the tuberculous are listed in Table II.

This total is 694 beds, which, with 1,384 beds in our county sanatoria, gives a grand total of 2,078 beds for the tuberculous in the State of Minnesota.

TABLE I

| SANATORIA | LOCATION | COUNTIES | CAPACITY |
|---|---|---|---|
| Nopeming* | Nopeming | St. Louis | 200 |
| Otter Tail County | Battle Lake | Otter Tail | 46 |
| Tuberculosis Pavilion | St. Paul | Ramsay | 125 |
| Mineral Springs | Cannon Falls | Goodhue, Rice, Dakota | 40 |
| Glen Lake | Oak Terrace | Hennepin | 600 |
| Sunnyrest | Crookston | Polk, Norman | 60 |
| Lake Julia | Puposky | Beltrami, Koochiching, Hubbard | 48 |
| Sand Beach | Lake Park | Clay, Becker | 50 |
| Buena Vista | Wabasha | Wabasha, Winona, Olmsted | 24 |
| Riverside | Granite Falls | Chippewa, Lac Qui Parle, Yellow Medicine, Renville | 50 |
| S. W. Minnesota | Worthington | Lincoln, Lyon, Pipestone, Murray, Cottonwood, Rock, Nobles, Jackson | 55 |
| Oakland Park | Thief River Falls | Marshall, Roseau, Pennington, Red Lake | 32 |
| Fair Oaks Lodge | Wadena | Todd, Wadena | 30 |
| Deerwood | Deerwood | Crow Wing, Aitkin | 24 |

The total bed capacity of these institutions is 1,384.

*A new infirmary is in process of building at Nopeming which will accommodate 50 patients.

TABLE II

| | | |
|---|---|---|
| State Sanatorium | Walker | 325 beds |
| THREE PRIVATE INSTITUTIONS: | | |
| Pokegama | Pine City | 50 beds |
| Home Sanatorium | Rochester | 12 beds |
| Oronoco | Rochester | 24 beds |
| Park-View (The tuberculosis Division of the Minneapolis General Hospital) | Minneapolis | 130 beds |
| Thomas Hospital | Minneapolis | 65 beds |
| U. S. Veterans Hospital No. 68 | Minneapolis | 88 beds |

At the 1925 session of the state legislature by an act in relation to the organization of the state government the Advisory Commission of the State Sanatorium for Consumptives was abolished. Under the title of the State Board of Control the Department of Public Institutions was created. This Department now exercises the rights and powers and performs the duties conferred by law upon the Advisory Commission of the State Sanatorium for Consumptives.

Briefly, the duties of the Department of Public Institutions are as follows: When a county or group of counties have decided to build, and have raised the necessary funds for building, a tuberculosis sanatorium, the sanatorium commission may decide on the location, establishing and maintenance of sanatorium building upon the approval and consent of the Department of Public Institutions. But before final action is taken, plans and specifications must be submitted to the State Board of Health.

The Department of Administration and Finance has full power and control over the construction and equipment of any such sanatorium whose establishment has been determined upon by the county sanatorium commission.

A county, or group of counties, wishing to establish a sanatorium may, through the Board or Boards of County Commissioners, appropriate one-half the necessary funds for the establishment, construction and equipment of the same. The State Treasurer will then pay out of funds provided for same, one-half the cost of the erection and equipment of each such sanatorium, including cost of site, this payment being made in the manner provided by law for the payment of expense incurred by the Department of Administration and Finance in the erection and equipment of public buildings, provided the amount contributed by the state towards the cost of the erection and equipment of each such sanatorium, including site, shall not exceed fifty thousand ($50,000) dollars.

For the maintenance of each free patient treated in the sanatorium, the sum of five ($5) dollars per week is paid to said county, or group of counties, by the State Treasurer monthly upon warrants of the State Auditor, drawn upon the State Treasurer, provided that the Executive Secretary of the Department of Public Institutions certifies that the institution has been properly conducted.

The first consideration in the management of each sanatorium is the welfare of the patient. As a result a high standard is maintained in all departments of the institution. Each sanatorium commission must engage a full-time medical director and superintendent. These positions may be filled by one individual. This is the case in all the sanatoria of this state except one, where the superintendent is a graduate nurse, experienced in the management of a tuberculosis sanatorium, but there is also a full-time medical director maintained by the institution. All medical directors of the sanatoria are physicians trained in the diagnosis and treatment of tuberculosis.

Any person suffering from tuberculosis, who is a legal resident of the State of Minnesota, that is, who has decided upon Minnesota as his home state and has resided in the state for at least one year, is eligible for care and treatment in any of the county sanatoria of the state. The sanatorium commission fixes the amount to be charged for the care, treatment and maintenance of each patient. This rate for patients from the district supporting a sanatorium varies from $7.50 to $10 per week, one institution charging $21 per week. For cases coming from counties not supporting a sanatorium, the weekly rate varies from $12.25 to $21, most of the institutions recently having raised their rate to $19.25 per week, the average cost per week for the care, treatment and maintenance of a patient in a county sanatorium of this state.

When a patient from a sanatorium district is unable to pay, he is admitted as a free case, the state paying $5 weekly toward his care and treatment, the remainder being paid by the sanatorium. When a patient is admitted to a sanatorium, his financial condition, or the financial condition of those legally liable, is investigated by the sanatorium commission or its representative, and if the patient is found to be unable to pay he is admitted free of charge. If he is found to be financially able to pay some amount toward his maintenance, he is admitted as a part-pay case, and if he is able to pay the full amount, he is expected to do so.

In making application for admission to a sanatorium the method of choice is to have the person concerned have his physician write directly to the superintendent of the sanatorium asking for an application blank. This blank is filled in by the physician, giving all the required information regarding the patient, his legal residence, physical

and financial condition, etc., and is returned to the superintendent of the sanatorium.

Minimal or beginning cases of tuberculosis and those classified as moderately advanced cases, but who are in otherwise good condition, are preferred by the State Sanatorium. The County Sanatoria are, by law, required to give far advanced cases preference for admission. Each sanatorium superintendent keeps two lists of applicants—one for those from the sanatorium district, the other for applications from outside the district, the applications being listed according to the order of their receipt. It is only after the list of names from the sanatorium district is exhausted that recourse is had to the list from outside the district. No doubt, some of you here have, in late months, made application to a sanatorium in behalf of someone suffering from tuberculosis in whom you were interested, only to be told that there are no vacancies. This is both a fortunate and an unfortunate condition. It is fortunate in as much as it has proven the value of the institution and its teachings, on account of which the condition which existed some ten years ago, namely, the horror of the tuberculous individual at having to go to a sanatorium, has now changed to a situation where the person who receives a diagnosis of tuberculosis immediately seeks sanatorium care for himself.

The unfortunate situation of not being able to accommodate patients applying for care at a sanatorium shows that there are still certain districts which are not awake to the great need for more sanatorium beds to take care of the tuberculous in their community. It is particularly unfortunate for the suffering victim, who probably must needs continue being sick amid poor home conditions, with little or no medical and nursing care, and finally come to the fatal end. It is said, "Public health is purchasable. Within natural limitations a community can determine its own death rate." In 1923 there were 1,846 deaths from tuberculosis, all forms, in Minnesota. In 1924 there were 1,710 deaths reported—136 deaths less than the year before. Were we to go back and compare previous years, since the anti-tuberculosis work has been started in Minnesota, a more or less similar lowering of mortality would be shown.

Statistics for this state also show that the decrease in mortality is greater in counties supporting sanatoria than in the counties not supporting one.

A great deal also depends on the following up of patients discharged from the sanatorium, and this work is carried on through the permanent chest clinic and the visiting nurse, for many patients who have spent sufficient time at an institution and are in good enough condition to do so are allowed to return to their homes to continue their "cure taking," under supervision, until a cure is effected. It seems quite unnecessary for all patients to remain in a sanatorium until a permanent cure is made, as this most often means a period of years, and he thus would be depriving another patient of his rightful chance to enter a sanatorium for treatment and training.

We, who are on the battlefield fighting against the great white plague, are surveying an area too large to be depicted before your imaginations in a few short minutes.

But may I in closing make a plea for our fellow man or woman who is suffering from tuberculosis?

Let us all join arms to fight the worst disease to which the human body is subject, the White Plague. It is a world-wide conflict, and while no one of us can conquer single-handed, yet we can all of us work for better living conditions and create a strong public sentiment in favor of them. When we recognize how many human lives will thus be saved yearly, we can see that it will be fully worth while.

If you would help in the fight you could do it in several ways: first, by giving as much as you can of your money, time and influence to help the private agencies which are dealing with the tuberculosis problem, such as your local anti-tuberculosis organization and your local charitable societies; second, by helping as a citizen and a voter to secure adequate appropriations for your Board of Health and your local sanatoriums, hospitals and dispensaries; finally, by backing up the public health campaign by your words, your interest, your action and your influence.

## PHYSICIANS LICENSED AT THE JANUARY, 1926, EXAMINATION TO PRACTICE IN MINNESOTA

### BY EXAMINATION

| NAME | SCHOOL AND DATE OF GRADUATION | ADDRESS |
|---|---|---|
| Anderson, Gilbert Christian | Columbia, M.D., 1917 | Rochester, Minn. |
| Anderson, Harold Theodore | U. of Minn, M.B., 1925 | Minneapolis, 329 Union St. |
| Bayley, Emery Covell | U. of Minn, M.B., 1925 | Lake City, Minn. |
| Berge, David Oscar | N. W., 4 yr. Cert. Med., 1925 | St. Paul, Minn., Ancker Hospital |
| Beyer, Wm. S. | U. of Minn., M.B., 1925 | Minneapolis, 1082 17th Ave. S. E. |
| Brockbank, Thos. Wm. | Georgetown, M.D., 1924 | Rochester, Minn. |
| Burton, Carl Gustav | U. of Minn., M.B., 1925 | St. Paul, Minn., Bethesda Hospital |
| Dassett, Jos. Wm. | U. of Minn., M.B., 1925 | Minneapolis, 3128 Hennepin Ave. |
| Dodge, Warren Maynard, Jr. | U. of Minn., M.B., 1925 | Farmington, Minn. |
| Eich, Matthew | U. of Minn., M.B., 1925 | Minneapolis General Hospital |
| Etheredge, Shuler Hardin | Med. Coll. of So. Car., M.D., 1924 | Rochester, Minn. |
| Farabaugh, Charles L. | U. of Minn., M.B., 1925 | St. Paul, Ancker Hospital |
| Forster, Walter Livingstone | Rush, Cert. Med., 1925 | St. Paul, Ancker Hospital |
| Freedman, Newman Barnett | McGill, M.D., 1923 | Rochester, Minn. |
| Freise, Paul W. | N. W., Cert. Med., 1925 | Minneapolis, St. Mary's Hospital |
| Gillespie, James Ogilvie | U. of Minn., M.B., 1925 | Forest River, N. D. |
| Hart, Wm. Eustis | Wash. U., Mo., M.D., 1925 | Minneapolis, St. Mary's Hospital |
| Hunter, Elmer Noble | U. of Minn., M.B., 1925 | Detroit, Mich., care of Receiving Hospital |
| Huseby, H. Walter | U. of Minn., M.B., 1925 | Minneapolis General Hospital |
| Jacobson, Clarence | U. of Minn., M.B., 1925 | Duluth, 400 N. 58th Ave. |
| Jensen, Herman H. | U. of Minn., M.D., 1925 | Minneapolis, U. of Minn. |
| Johnson, Olga Holie | U. of Minn., M.B., 1925 | Minneapolis, 512 Delaware |
| Kepler, Edwin John | U. of Minn., M.D., 1925 | Rochester, Minn. |
| Lufkin, Nathaniel Hall | U. of Minn., M.B., 1925 | St. Paul, 617 Goodrich |
| Macfarlane, Peter Harvie | U. of Minn., M.B., 1925 | Minneapolis, 515 Ontario |
| McDonald, Robert Edmund | U. of Minn., M.B., 1925 | Minneapolis, 3952 Aldrich |
| McMahon, Leo Hartney | St. Louis U., M.D., 1925 | Breckenridge, Minn. |
| Maxwell, Harvey Cecil | U. of Minn., M.B., 1925 | Minneapolis, 3303 2nd Ave. S. |
| Meland, Ernest Lawrence | U. of Minn., M.B., 1925 | Pelican Rapids, Minn. |
| Muir, Edwin Clay | U. of Minn., M.B., 1925 | Winona, Minn. |
| Parsons, Eloise | Rush, M.D., 1925 | Rochester, Minn. |
| Rens, John Louis | U. of Minn., M.B., 1925 | Minneapolis, 2927 46th Ave. S. |
| Schroeder, Wm. Frederick | U. of Minn., M.B., 1925 | Minneapolis, 1063 13th Ave. S. E. |
| Sitar, Richard Frank | N. W., Cert. Med., 1925 | St. Paul, Ancker Hospital |
| Somerfield, Harry Alexander | Stanford U., M.D., 1925 | U. of Minnesota |
| Sontag, Lester Warren | U. of Minn., M.B., 1925 | Heron Lake, Minn. |
| Stephenson, Robert Abram | Columbia, M.D., 1918 | St. Paul, St. Luke's Hospital |
| Swenson, Orvie John | U. of Minn., M.B., 1925 | Minneapolis, 815 8th Ave. S. |
| Tuttle, Glen Willis | U. of Minn., M.B., 1925 | Minneapolis, University Hospital |
| Warner, Harry Reuben | U. of Minn., M.B., 1925 | St. Paul, 2232 Langford |
| Wenaas, Elmer Justin | Geo. Wash. U., M.D., 1924 | Mt. Iron, Minn. |
| Wilhelmj, Chas. Martell | St. Louis U., M.D., 1922 | Rochester, Minn. |
| Winer, Louis Harry | U. of Minn., M.B., 1925 | Eveleth, Minn. |

### LICENSED THROUGH RECIPROCITY

| | | |
|---|---|---|
| Allen, Edgar Vannice | U. of Neb., M.D., 1925 | Rochester, Minn. |
| Bailey, Wm. T. | Tufts, M.D., 1909 | Nopeming, Minn. |
| Fortin, Harry John | N. W., M.D., 1916 | Rochester, Minn. |
| Jones, Robert Duval, Jr. | U. of Pa., M.D., 1924 | Rochester, Minn. |
| Kleinheksel, John Lewis | U. of Mich., M.D., 1924 | Rochester, Minn. |
| Shumate, John Kenly | Med. Coll. Va., M.D., 1921 | Nopeming, Minn. |

### LICENSED ON NATIONAL BOARD CERTIFICATE

| | | |
|---|---|---|
| Johnson, Norman Percy | Harvard, M.D., 1923 | Minneapolis, 1701 Irving Ave. S. |
| Smith, Harry LeRoy | U. of Iowa, M.D., 1916 | Rochester, Minn. |

# MINNESOTA MEDICINE

OFFICIAL JOURNAL MINNESOTA STATE MEDICAL ASSOCIATION, SOUTHERN MINNESOTA MEDICAL ASSOCIATION, NORTHERN MINNESOTA MEDICAL ASSOCIATION, AND MINNEAPOLIS SURGICAL SOCIETY

Owned and Published by
The Minnesota State Medical Association
Under the Direction of Its
EDITING AND PUBLISHING COMMITTEE

R. E. FARR, M.D. Minneapolis
JOHN M. ARMSTRONG, M.D. St. Paul
L. B. WILSON, M.D. Rochester
A. A. LAW, M.D. Minneapolis
J. T. CHRISTISON, M.D., St. Paul

**EDITORIAL OFFICE**
CARL B. DRAKE, M.D., Editor
402 Guardian Life Bldg., Saint Paul

**BUSINESS OFFICE**
J. R. BRUCE, Business Manager
402 Guardian Life Bldg., Saint Paul
Telephone: Cedar 1683
300 Commercial Bldg., Minneapolis
Telephone: Atlantic 2716

All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Journal itself, not to individuals.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

The rate for classified advertising is five cents per word with a minimum charge of $1.00 for each insertion. Remittance should accompany order. Display advertising rates will be furnished on request.




**Subscription Price: $3.00 per annum in advance. Single Copies 25c. Foreign Countries $3.50 per annum.**

VOL. IX APRIL, 1926 No. 4

## EDITORIAL

### The Constitution of the Association

One of the important business matters which will come before the House of Delegates of the State Medical Association when it meets in St. Paul, May 17, will be the consideration of changes in the constitution of the Association proposed by the special committee appointed by the Council last May.

The committee has worked hard at their task. The constitution has been brought up to date and copies of the constitution with certain proposed additions have been mailed to officers and delegates of the various component societies. It behooves each delegate to study the proposals and to determine how his constituents stand on each proposal. Only in this way will confusion and an endless wrangle be avoided.

It is proposed that the phrase "to promote public health" be added to the purposes of our Association. The profession is peculiarly in a position to give advice in public health matters and the promotion of public health is one of its proper functions, but this addition should not be construed as an assumption of responsibility for the public health. This responsibility lies with the public as a whole and most of the burden falls on state and municipal health departments and primarily on the legislature.

A new class of "emeritus members" is suggested. According to this provision any member of twenty-five years' standing in a component county society and having reached the age of sixty may, if he so desires, ask to be placed on the emeritus list of his county society. Such emeritus members in a county society will automatically become emeritus members of the State Association with all the rights and privileges of membership except those of voting and subscription to the journal. It is only fitting that such a courtesy be extended to members of long standing.

It is further suggested that authority be given the treasurer to sign checks authorized by the secretary alone. For the most part signature of checks by the president has been a cumbersome and oft-times a perfunctory performance. The treasurer's membership in the Council and House of Delegates enables him to know first hand what expenditures have been authorized. The Council will doubtless see to it that bonding of the treasurer will cover any possible irregularity of a secretary.

At times questions have arisen between meetings of the House of Delegates over which the Council has felt it had no authority. It is proposed in a new section to delegate the powers of the House of Delegates to the Council during such interim.

Each of the proposed changes in our constitution should receive the careful consideration of the officers and delegates prior to the meeting in May.

### The Crime Wave

The unquestionable increase in crime throughout the country in recent years is a subject which vitally concerns everyone. The remedy offers a problem which in a democracy such as ours will have to be solved by the people themselves.

An interesting and at the same time discouraging report prepared by the Anti-Saloon League of the number of arrests made in some 300 American cities shows: (1) That after a temporary decline

immediately following national prohibition the number of arrests for drunkenness had returned by 1923 to about the pre-Volstead figure; (2) that arrests for other infringements of law have markedly increased during 1922 and 1923. The more recent figures for 1924 and 1925 are not given, but presumably the curve is on the rise.

It must be remembered that the more personal conduct laws that are enacted by our legislatures, the more violations will occur and presumably the greater number of arrests will result. We have too many laws of this character already. They are so numerous that one must become a student of law in order to approach the possibility of being a law-abiding citizen in the fullest sense of the word. The useless and absurd laws now on the statute books of our state should be repealed. For instance, (1) it is unlawful to play on Sunday (this means golf as well as other forms of relaxation); (2) it is unlawful for a hotel keeper to use sheets less than ninety-nine inches long before washing—these sheets must also be at least two feet wider than the mattress which they cover; (3) cranberries may not be picked on other people's property before September 1 each year, the inference being that blueberries may be picked before that date and cranberries after that date irrespective of where they grow; (4) it is unlawful to make purchase of or give away a cigarette containing aught but tobacco. (How about some popular brands of cheap cigarettes?)

Certain reforms in our methods of the administration of justice are pressing if criminals are to be deterred. The courts are very commonly held responsible for cumbersome procedure which defeats swift meting of justice, whereas defects in the criminal procedural laws are to blame. At the last session of the state legislature certain changes in court procedure in the interest of more speedy and sure administration of justice were proposed by a committee of judges headed by Judge Sanborn, now of the United States District Court for the District of Minnesota. These recommendations had been endorsed by the legal profession, the county attorneys and the district judges of the state, but failed to pass except in one or two minor instances simply because they failed to receive the backing and support of the public generally, which their importance demanded. About the only interest taken in the proposed legislation was made by criminal lawyers, who are naturally opposed to reforms in the criminal procedural laws.

For fear that an innocent citizen may not receive full justice in the courts, certain laws are in effect which give the criminal a very great advantage over the prosecution. For instance, in the selection of jurors in the trial of a criminal case, if the offense charged be punishable with life imprisonment, the state is entitled to ten, while the defendant may have twenty, peremptory challenges. It is reversible error for the prosecutor to call the jury's attention to the defendant's failure to testify in his own behalf. The state must first sum up and is given no opportunity to reply to the closing arguments of the defense. Each accused individual has the right to demand a separate trial even though the evidence may be identical against a group of a dozen or more who have participated in the same offence. The recommendations above mentioned were offered, among others, in the interest of removing some of the handicaps of the state in prosecuting criminal cases and in the furtherance of justice, but the legislature would have none of it.

The question of the advisability of continuing the indeterminate sentence and the parole board are of comparatively minor importance. As a matter of fact the average time served by sentenced criminals since the indeterminate sentence has been in effect has been materially greater than before. Figures show that about one-third only of the prisoners receiving an indeterminate sentence are ever paroled, one-third are conditionally discharged, and one-third serve the maximum sentence. Of those paroled only 20 per cent are returned to prison for breaking their parole, and of this 20 per cent, less than half are returned for committing a serious offense. If the fact that a few paroled prisoners do break their parole is ground for abandoning the parole system, then by the same process of reasoning no convicted individual should ever be released from imprisonment, since all agree that many discharged prisoners also commit crimes.

Few realize what a nation-wide organization of professional criminals exists. The recent investigation of nation-wide bootlegging serves to illustrate the true state of affairs. If the organization of crime is to be fought successfully, county, state and national government must meet the criminals with increased financial expenditure and manpower.

Incidentally, our judges are shamefully under-

paid. A lawyer accepts a position as judge only at great personal sacrifice financially. It is not uncommon for lawyers on both sides of some important case to receive more in that one case than the judge who tries it receives in a year. How can we expect our courts to be manned by men of superior ability when such a situation exists?

Much might be said of the need for more moral and spiritual training for the younger generation. The effect of such present-day influences as the movie, automobile and salacious literature doubtless plays a part. National prohibition is perhaps too young to conclude what effect it has had by transferring the question of drinking from a moral to a legal status.

Fewer laws, better legislation, increased resistance to organized crime offer the only solution to the increasing crime in our country and this will only be accomplished by an awaking of public opinion.

---

### Dr. Thomas McDavitt

The organized medical profession will keenly feel the passing of our friend and confrere, Dr. Thomas McDavitt. Some members of the profession acquire excellence in a narrow field of professional endeavor and do little or nothing for the activities of organized medicine. This cannot be said of Dr. McDavitt. Although a specialist he possessed unusual executive ability and placed this ability at the disposal of our state and national organizations.

As secretary of the Minnesota State Medical Association from 1900 to 1919 he rendered valuable service to the organization in this state. As trustee of the American Medical Association and chairman of the finance committee he attained national recognition of his executive ability and his counsel was ever in demand.

Few realize the trials and tribulations of the secretary of a state board of medical examiners. As secretary of the Minnesota Board, Dr. McDavitt repeatedly had the discouraging experience of having his efforts in carrying out the law relating to medical practice frustrated by the courts.

Dr. McDavitt was ever ready to tender his counsel and advice to the younger members of the profession and it is with appreciation and regret that we join with his many friends in expressing our deep sense of loss.

## OBITUARY

### DR. THOMAS McDAVITT

Dr. Thomas McDavitt was born May 15, 1857, in St. Louis, Missouri. His father, Dr. Virgil McDavitt, born in Bowling Green, Kentucky, in 1835, and his paternal grandfather, born in 1795 in Rockbridge County, Virginia, were both physicians. A brother, also a physician, practiced at Bowling Green, Kentucky.

Dr. McDavitt received his medical training at Northwestern Medical School, graduating in 1879. He first became associated with Dr. Dwight F. Brooks at Minneiska, Minnesota, in 1880, moving to Winona, where for about ten years he was associated in general practice with Dr. J. B. McGaughey.

In 1889 he went to Europe, where he spent some thirteen months in the eye and ear clinics of Vienna, Paris and Berlin. Upon his return he came to St. Paul, where for thirty-six years he specialized in eye and ear diseases, being associated for the first seven years with Dr. John Fulton.

Always interested in medical organization and possessing more than ordinary ability as an executive, Dr. McDavitt acted from time to time in various official capacities. From 1900 to 1919 he was secretary of the Minnesota State Medical Association. In the early nineties and continuously from 1912 to the time of his death he was secretary of the Minnesota State Board of Medical Examiners. He served last year as president of the Federation of State Medical Boards. At the time of our participation in the World War he took an active part as a member of the Advisory Board of the War Department, and also as a member of the Volunteers Medical Service Corps. He was a charter member and in 1915 president of the Minnesota Academy of Ophthalmology and Otolaryngology. Perhaps, Dr. McDavitt was best known nationally as a member of the Board of Trustees of the American Medical Association, acting at one time as chairman. He was a member of the Board from 1913 to the time of his death. He was also a member of the American College of Surgeons and a Mason.

Dr. McDavitt had been suffering from heart trouble following an acute attack a year ago. His death on the morning of March fourth nevertheless came as a shock to his many friends and associates.

Dr. McDavitt married Harriet Easton of La Crosse, who survives him. He is also survived by his mother, Mrs. Caroline McDavitt, and his sister, Mrs. Ira Calkins, both of Quincy, Illinois, and three daughters, Mrs. Charles Eastwick Smith of St. Paul, Mrs. Heber G. Stout of Milwaukee, Mrs. Donald Konantz of Winnipeg, and six grandchildren.

# REPORTS AND ANNOUNCEMENTS OF SOCIETIES

## MINNESOTA STATE MEDICAL ASSOCIATION

May 17-19, 1926, St. Paul
Joint Meeting With
St. Paul Clinic Week Section of the
Ramsey County Medical Society
May 20, 1926, St. Paul

This year the annual meeting of the Minnesota State Medical Association will be held conjointly with a day of clinics under the auspices of the Clinical Section of the Ramsey County Medical Society. The Thursday following the three days of the State meeting will be devoted to clinics to be given at all the St. Paul hospitals by local physicians and surgeons.

The Council will meet first Monday morning, May 17, and the House of Delegates at 2 P. M. the same day. The second meeting of the House of Delegates will be at luncheon Tuesday, May 18, at which time election of officers will take place.

The Medical Economics meeting, a successful innovation last year, will take place Monday evening, May 17. This meeting last year proved so interesting that many medical societies have flattered our Association by imitating us. The following interesting program has been arranged for the economics meeting:

Fads and Quacks—Dr. Morris Fishbein, Editor, A. M. A. Journal.

Degenerative Diseases and Periodic Health Examinations—Dr. C. P. Emerson, Dean Indiana University Medical College.

The Medical Profession and the Press—Mr. Herbert R. Galt, Managing Editor, Dispatch and Pioneer Press.

Tuesday evening, May 18, the annual banquet will be held for physicians only. Dr. J. T. Christison of St. Paul will preside and the members will be addressed by the Mayor of St. Paul, Governor Christianson, President Johnson, the newly elected president of the State Association, Dr. Charles Mayo and Dr. C. P. Emerson.

The scientific program will occupy all of Tuesday and Wednesday with joint medical and surgical sessions each morning and afternoon.

The following preliminary notice of the scientific sessions has been announced:

Recent Progress of Psychiatry—Dr. G. N. Ruhberg, St. Paul.

Psychological Hospital—Dr. S. T. Orton, Iowa City, Iowa, Prof. Psych., Iowa State Psychopathic Hospital.

Acute Laryngeal Obstruction—Dr. G. W. Adler, Winona.

Symposium on Infantile Paralysis—Dr. C. C. Chatterton, St. Paul; Dr. M. S. Henderson, Rochester; Dr. Frank Whitmore, St. Paul.

Symposium on Cardiovascular Renal Disease—Dr. H. Berglund, Minneapolis, Professor of Medicine, University of Minnesota; Dr. L. G. Rowntree, Rochester; Dr. C. P. Emerson, Indianapolis, Dean Indiana University Medical College; Dr. V. C. Hunt, Rochester.

A Consideration of Certain Features of Angina Pectoris—Dr. F. M. Smith, Iowa City, Iowa, Professor Theoretical and Practical Medicine.

Surgical Treatment of Periduodenitis—Dr. E. P. Quain, Bismarck, N. D.

Clinic on Diseases of the Thorax—Dr. W. S. Lemon and S. W. Harrington, Rochester.

Treatment of Athletic Injuries—Dr. C. W. Spears, Minneapolis.

Clinic on Gastric Diseases—Dr. Arnold Schwyzer, St. Paul

Surgery of the Infant Abdomen—Dr. A. A. Zierold, Minneapolis.

Wednesday evening, following the scientific program, an entertainment for visiting physicians and their wives will be offered by the Ramsey County Medical Society. Talented members of the local profession and their families will furnish the program, which will be followed by a dance.

Thursday will be devoted to clinics at the various St. Paul hospitals under the direction of the Ramsey County Clinic Week committee.

The Women's Auxiliary of the Minnesota State Medical Association will hold its annual meeting Tuesday afternoon for the election of officers. The officers at present are:

President—Mrs. J. T. Christison, St. Paul.
1st Vice President—Mrs. O. A. Oredson, Duluth.
2nd Vice President—Mrs. W. L. Burnap, Fergus Falls.
3rd Vice President—Mrs. J. D. Lyon, Minneapolis.
Recording Secretary—Mrs. G. K. Hagaman, St. Paul.
Corresponding Secretary—Mrs. F. C. Rodda, Minneapolis.
Treasurer—Mrs. C. L. Larsen, St. Paul.
Auditor—Mrs. Wade Humphrey, Stillwater.

Date of Annual Meeting—Tuesday afternoon, May 18, 1926.

Three vice presidents, treasurer and corresponding secretary to be elected at this meeting.

During the State Medical Meeting, the Women's Auxiliary will present the educational program for visiting doctors' wives.

Mrs. J. T. Christison, President of the State Auxiliary, is chairman of the program committee, and the executive board constitute the committee.

Ramsey County Auxiliary will act as hostess at several social functions. Mrs. E. C. Eshelby, President, and Mrs. Henry Klein, chairman of the entertainment committee, are in charge of the arrangements.

The following committees have been appointed:
Membership—Mrs. E. C. Eshelby, St. Paul.
Legislative—Mrs. Woodard Colby, St. Paul.
Publicity—Mrs. Sherman S. Hesselgrave, St. Paul.

During the convention the Women's Auxiliary will present an educational program for the visiting doctors' wives.

The Ramsey County Women's Auxiliary will act as hostesses at several social functions. Mrs. E. C. Eshelby is this year's president of the local auxiliary and Mrs. Henry Klein, chairman of the entertainment committee. Mrs. Eshelby is chairman of the membership committee, Mrs. Woodard Colby of the legislative committee and Mrs. Sherman S. Hesselgrave of the publicity committee of the local chapter.

The annual meeting and luncheon of the Minnesota Medical Alumni will be held Wednesday noon, May 19.

Among the interesting exhibits which will be made at the meeting are the following:

Drs. E. T. Bell and B. J. Clawson, Department of Pathol-

ogy, will show their recent work on experimental chronic and embolic glomerulonephritis. In addition they will have a display of hearts showing various types of valvular and muscular disease. Microscopic sections and drawings will be exhibited.

Dr. Gordon B. New of the Mayo Clinic will demonstrate laryngeal specimens removed for cancer. The demonstration will be in charge of Dr. Waltman Walters.

Dr. T. B. Magath will show a moving picture film of human intestinal parasites.

Dr. Hilding Berglund, Professor of Medicine, University of Minnesota, will give a demonstration of laboratory and bedside methods for blood sugar determination. Colorimeters will be on display and a demonstrator will be in charge.

Dr. W. P. Larson has consented to give a demonstration of his work on diphtheria, scarlet fever and tetanus toxins. By the admixture of soap these toxins are rendered harmless, and immunization results in apparently as great a number of instances and in a much shorter space of time than by the usual method. In addition, serum sensitization is avoided. This method has been in use for some time and its value is apparently established. He will show animals injected with pure toxin and other animals injected with toxin-soap combinations.

A list of the officers and committees on arrangements for the joint meetings of the Minnesota State Medical Association Convention and the Ramsey County Clinic Week:

President—Dr. C. C. Chatterton.
Vice President—Dr. F. J. Savage.
Secretary—Dr. A. G. Schulze.
General Chairman—Dr. George Earl.
General Secretary—Dr. Warner Ogden.
Banquet Committee—Dr. J. T. Christison, chairman; Drs. C. N. McCloud, W. R. McCarthy.
Civic Clubs—Dr. H. O. Skinner, chairman; Drs. J. F. Borg, H. H. Wolfe.
Clinical Material—Dr. E. M. Hammes, chairman.
Convention Hall—Dr. Donald Bacon, chairman; Drs. C. C. Bell, H. E. Richardson, Frank Whitmore.
Entertainment—Dr. A. E. Comstock, chairman; Drs. Geo. A. Geist, W. C. Rutherford.
Exhibits—Dr. T. J. Maloney, chairman; Drs. W. R. McCarthy, Edw. Schons.
Hospital Clinics—Dr. F. C. Schuldt, chairman; Drs. W. C. Carroll, E. H. Norris, H. B. Zimmerman, P. H. Kelly, L. A. Hilger, E. J. Engberg, A. W. Ide, O. W. Sterner, E. O. Giere.
Ladies—Mrs. E. C. Eshelby, chairman.
Publicity—Dr. E. A. Meyerding, chairman; Drs. R. A. Bock, J. E. Fulton.
Reception—Dr. A. P. Gruenhagen, chairman; Drs. H. E. Binger, W. Ray Shannon.
Reunions—Dr. C. N. McCloud, chairman; Dr. John M. Culligan.

## SOUTHERN MINNESOTA MEDICAL ASSOCIATION

The Executive Committee of the Southern Minnesota Medical Association has announced that the regular annual meeting will be held October 18, 1926, instead of in the spring of the year as heretofore. Mankato has been chosen as the place of meeting.

# OF GENERAL INTEREST

Dr. Owen W. Parker of the Shipman Hospital staff, Ely, Minn., has returned from a visit to Chicago, New York and Washington.

Dr. Herbert Boysen, who has been located at Truman, Minnesota, is now practicing his profession at Welcome, Minnesota.

Dr. W. B. Richards of St. Cloud has announced the opening of offices in Suite 303, St. Mary's Building, with practice limited to obstetrics, infant feeding and diseases of children.

The annual address delivered before the Minnesota Pathological Society was given this year by Dr. F. C. Mann of Rochester on the subject, "The Site of Formation and Origin of Bile Pigment," at the meeting held March 16 in the Institute of Anatomy, University of Minnesota.

Dr. Willis Campbell of Memphis, Tennessee, will speak under the auspices of the Minnesota Orthopedic Club on the subject of "The Mobilization of Stiff Joints," in the Anatomy amphitheater of the University of Minnesota at 8 P. M., April 6, 1926. The address will be illustrated by animals, cartoons and motion pictures. All physicians are cordially invited.

Emory University, at Atlanta, Georgia, announces the launching of a $4,500,000 endowment and building program for its medical school (formerly the Atlanta Medical College) and hospital (the Wesley Memorial Hospital). The support of the medical profession is solicited. The $10,000,000 expansion campaign now under way will provide for all schools of the University, which are as follows: the College of Liberal Arts, the School of Medicine, the Graduate School, the School of Business Administration, the School of Law, and the School of Theology.

The American Board of Otolaryngology has arranged for two examinations during the month of April, as follows:

St. Paul's Sanitarium, Dallas, Texas, Monday, April 19, at 9 A. M.

Stanford University Medical School, Clay and Webster Streets, San Francisco, California, Tuesday, April 27, at 9 A. M.

Applications may be secured from the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

The Board of Directors of the Hennepin County Public Health Association has unanimously invited Dr. Richard Olding Beard, who recently retired from active teaching service at the University, to take the Field Secretaryship of the Association upon a part-time basis.

Dr. Beard has accepted the appointment, with the understanding that he will continue to devote a major part of his time to the direction of the Committee on Endowment and Building Funds of the Medical School of the University. He is Chairman and General Secretary of this Committee and has been initially responsible for the promotion of its work since its appointment.

## STATE HEALTH DEPARTMENT

### COUNTY SOCIETIES TO CONDUCT CAMPAIGN AGAINST DIPHTHERIA

The last issue of MINNESOTA MEDICINE announced that the State Health Department will supply diphtheria toxin-antitoxin and material for the Schick test free of charge.

The diphtheria statistics for 1925 are now available. The mortality rate per 100,000 population from diphtheria in Minnesota was 9.01. This is about the same as the 1921 rate (9.03), but higher than the rates for 1922 (7.74), 1923 (8.40), 1924 (8.61). There were 3,778 cases reported and 231 deaths, with a fatality of 6.1 per 100 cases in 1925. This exceeds the fatality rates of 1921 (5.0), 1922 (4.5), 1923 (4.7), and 1924 (5.8). Minneapolis reported 1,717 cases with 108 deaths; St. Paul, 805 cases with 32 deaths; Duluth, 21 cases and no deaths. Duluth's record is a remarkable one for a city of 110,000. Exclusive of these cities, 1,235 cases with 91 deaths were reported. The ages of the fatal cases in 1925 were—

| | Deaths |
|---|---|
| Under 5 years | 77 |
| 5 - 9 | 79 |
| 10 - 14 | 30 |
| 15 - 19 | 10 |
| 20 or older | 35 |

These figures show that the physician in general practice has a greater opportunity to do effective work in the prevention of sickness and for the saving of the lives of children by using toxin-antitoxin for immunization against diphtheria than the health officer. Therefore, the State Board of Health feels that each County and District Society should take the initiative and in co-operation with the boards of health and the boards of education of the counties, cities and villages should formulate plans for the systematic use of toxin-antitoxin among children of pre-school age and in the public and parochial schools throughout Minnesota. Dr. Herman Johnson, president of the State Medical Association, suggests that doctors protect their own children first.

The State Department of Health will loan moving picture films furnished by the Metropolitan Life Insurance Co. and by the John Hancock Mutual Life Insurance Co., upon request, but the express charges for the films must be paid by the locality. Exceedingly attractive and interesting pamphlets about diphtheria may be obtained free of charge from the Metropolitan Life Ins. Co., New York City, or from the John Hancock Mutual Life Ins. Co., Boston, Mass., on request to the Home Offices, or through the district managers of these companies in Minnesota. The State Board of Health approves of the use of these pamphlets by local health authorities.

The State Department of Health will supply free of charge by mail on request of any physician the following material for diphtheria immunization: Toxin-antitoxin in 30 c.c. vials, or 10 c.c. vials, and when required by special circumstances the individual packages of three vials of 1 c.c. each.

Record cards providing for the signed request of parent or guardian for inoculation of the child and for record of the three toxin-antitoxin injections and of the Schick test, will be supplied, also.

It is very important that all records of all toxin-antitoxin treatments and the subsequent Schick test be filed where they may be accessible for future reference. Suitable arrangments will be made in each community for the keeping of permanent files of toxin-antitoxin records.

Requests for toxin-antitoxin and Schick test material should be addressed to the State Department of Health, Old Capitol, St. Paul, Minn.

---

## ERRATUM

In the report of the annual meeting of the Rice County Medical Society published in the February issue of MINNESOTA MEDICINE, an error was made in the name of the compensation adjustor for the Minnesota Industrial Commission. The name should have appeared as Mr. Hugo Koch.

---

# NEW AND NON-OFFICIAL REMEDIES

## PROPAGANDA FOR REFORM

*Antistreptococcus Serum.*—For some years the Council has been questioning the value of antistreptococcus serums. These products have been retained in New and Non-official Remedies with the caution that on the basis of clinical reports there is perhaps justification for the use of the serum in streptococcus infections, but that there is no scientific basis for it. In consideration of a report prepared by Dr. Emil Novak on the basis of a questionnaire sent to a number of surgeons, gynecologists and obstetricians, the Council voted to retain antistreptococcus serum preparations in New and Non-official Remedies provisionally. (Jour. A. M. A., Feb. 6, 1926, p. 417.)

*Sanocrysin.*—In spite of the disappointing results from the use of "Sanocrysin" in animal tuberculosis in the careful experiments carried out for the Hygienic Laboratory by Theobald Smith, Wm. H. Park and E. C. Schroeder, it is possible that some renewal of interest may arise as a result of recent papers by European physicians on the use of sodium-gold thiosulphate in human cases of tuberculosis. One naturally views with doubt the value of these reports, since these physicians have discarded the theories originally advanced and, to a large extent, also, the use of the antitoxic serum. They thus place the substance in the category of the gold salts used in the therapy of tuberculosis with which a long record of varied experiences is available. It is possible that the use of gold may have some value, but there is no evidence at hand today; hence the wisdom of American physicians in awaiting definite proof of action in animal tuberculosis before using it in the human disease will save much suffering and distress. (Jour. A. M. A., Feb. 13, 1926, p. 487.)

*National Health Service.* — Some time ago the United States Public Health Service issued a warning that the "National Health Service," Washington, D. C., was attempting to capitalize the research work done by the United States government and to confuse the public into believing that it was in some way identified with the Public Health Service of the government. The offices of the National

Health Service are no longer in Washington, D. C., but in New York City. The concern is either operated from two addresses—17 West Sixtieth Street and 70 Fifth Avenue—or there are two concerns of the same name. From the first address a so-called "Book of Health," a urinalysis "health service" and a line of fad foods are sold. From the Fifth Avenue address letters are sent to industrial concerns urging them to purchase "a remarkable discovery for kidney disease, which has produced unbelievable results even in extreme cases where all other means have failed." An analysis of Rensano made in the A. M. A. Chemical Laboratory confirmed by pharmacologic tests carried out at the University of Illinois showed that Rensano is essentially milk sugar with a minute amount of alcohol. This inert and therapeutically worthless product is exploited to individuals and industrial plants with the suggestion that working men suffering from such serious conditions as nephritis and diabetes should be given this product in lieu of medical attention. (Jour. A. M. A., Feb. 13, 1926, p. 502.)

*Formaldehyde Fumigators.*—The term "solidified formaldehyde" is used loosely, sometimes denoting dry paraformaldehyde but more generally denoting a solidified mass of soap, tallow, or such substance with formaldehyde. When paraformaldehyde is heated, formaldehyde and some sublimed paraformaldehyde are given off. The amount of formaldehyde yielded depends on a number of conditions. In the case of solidified formaldehyde, the concentration of the formaldehyde and the amount of vapor evolved must be known to judge its efficiency. Fumigation as a means of preventing the spread of disease is regarded as far less important than formerly. (Jour. A. M. A., Feb. 13, 1926, p. 505.)

*Acacia and Intravenous Injections.*—The harmfulness of acacia in the treatment of shock and hemorrhage has been pointed out repeatedly. The changes resulting from the use of this otherwise inert agent bear on the many sided question of intravenous therapy. The investigations of Hanzlik have shown the wide changes which occur in the blood and tissues. Confirmatory of the work of Hanzlik, it was found that the blood after injection of acacia is definitely altered. The danger of intravenous injection of acacia has been fully demonstrated. The warning against acacia may be extended to other blood substitutes and, in fact, to intravenous injections in general. (Jour. A. M. A., Feb. 20, 1926, p. 556.)

*Administration of Mercury and Arsphenamine.*—The arsphenamines are so reactive that they may not be combined in solutions with mercury salts for intravenous administration. Alternation of drugs, rather than simultaneous administration, is the present trend of antisyphilitic medication. Mercury compounds administered intravenously should be given more frequently and over a longer time than is permissible for the administration of arsphenamine in sufficiently large doses. Furthermore, it is generally advisable not to give intravenous mercury medication, but to employ the forms such as the insoluble salts (or certain soluble salts) intramuscularly or to apply inunctions. (Jour. A. M. A., Feb. 20, 1926, p. 572.)

*Pertussin.*—The reason the medical profession should refuse to prescribe Pertussin is not primarily because the stuff is advertised to the public, but that it is a product of indefinite composition, marketed under a non-descriptive, therapeutically suggestive name, and is exploited with misleading claims. Pertussin is one of many proprietaries which has been popularized through the uncritical testimonials given the physician. (Jour. A. M. A., Feb. 20, 1926, p. 573.)

*Glucose-Dextrose.*—Legislation now under consideration in Congress aims to modify the interpretation of the Federal Food and Drugs Act so that food products shall not be deemed adulterated or misbranded "because of having been preserved or sweetened with an article commonly known as corn sugar, also with an article known as fruit sugar or levulose." From the standpoint of nutrition and health, no reasonable objection can be offered to this proposal. It should be emphasized that in the new pharmacopeia "glucose" connotes the syrupy substance; the pure substance such as is used for treatment of hyperglycemia following a large dose of insulin is now described under the name dextrose (sometimes called d-glucose; formerly described also under the name anhydrous glucose). This may lead to confusion, as many physicians still speak of "glucose" injections, which under the new pharmacopeia are really "dextrose" injections. (Jour. A. M. A., Feb. 27, 1926, p. 628.)

*Cod Liver Oil Emulsions.*—As a short period of aeration at a low temperature does not lead to destruction of either vitamin A or vitamin D (the antirachitic vitamin) it is safe to say that emulsified cod liver oil is equal in vitamin potency to the unemulsified.

---

# PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

---

### Meeting of January 13, 1926

The Minnesota Academy of Medicine held its regular monthly meeting at the Town and Country Club on Wednesday evening, January 12, 1926, at 8 o'clock. There were 35 members and 2 visitors present.

The meeting was called to order by the President, Dr. H. L. Ulrich.

Upon ballot the following men were elected to Associate Membership in the Academy:

Dr. H. F. Helmholz, Rochester.
Dr. Donald C. Balfour, Rochester.
Dr. H. Z. Giffin, Rochester.

Dr. Arnold Schwyzer (St. Paul) reported a case.

Dr. F. R. Wright (Minneapolis) read a paper entitled "Suprapubic Cystotomy."

#### DISCUSSION

Dr. Gilbert Thomas: I think Dr. Wright has covered the subject very thoroughly. The historical part of his paper is very interesting and I am glad to know that history reveals that urology has been a specialty for many hundreds of years. When one attempts to do a suprapubic cystotomy, in spite of the greatest care, the peritoneum is occasionally opened. This occurs not only when cutting, but when the peritoneum is packed away too roughly. This

is not a serious complication to suprapubic cystotomy providing the peritoneum is quickly repaired.

Dr. Wright: The reason why I sew the bladder to the aponeurosis is because if you use a plain drainage tube it is easily displaced and it is almost impossible to replace it if the bladder is not attached to the abdominal wall. If the bladder is attached, however, and the tube comes out it can be replaced without difficulty. The bladder can easily be detached and replaced in the abdomen after the drainage is taken out by the use of either local anesthetic or H.M.C. anesthetic.

---

Dr. Wm. F. Braasch (Rochester) read a paper, and showed a number of lantern slides, on "Ureteral Obstruction."

DISCUSSION

Dr. S. M. White: In the clinic, with the fullest co-operation between the internist and the urologist, we have been able to study a very considerable number of these individuals complaining of abdominal and back pains, and attempt a solution of their problem. Some of them do have genuine ureteral disorders such as accompany pyelitis, pyelocystitis, ureteral calculus, etc., but we would demand more evidence than a "hang" with a wax bulb bougie before accepting the diagnosis of ureteral stricture. It is difficult for me to conceive of stricture without evidence of real dilatation above it. Much more work by many trained men is needed. Dr. Braasch takes a very sound attitude in this connection. I heard Dr. Hunner's paper and was greatly interested in the subject, but think the time is not yet ripe to accept his conclusions in toto. The significance of a hang with the bougie, so far as it indicates stricture, can and will be solved with enough careful work such as that reported by Dr. Braasch. We certainly do not want to replace chronic appendicitis, the standby of the hasty diagnostician, with a new easy and quick refuge in the ureteral field.

Dr. A. R. Colvin: There seems to be a good deal of doubt about the existence of the ureteral strictures which Dr. Hunner describes. Since finding a stricture of the ureter (postmortem) due to a very small localized tuberculous lesion of the ureter, I have wondered if it is not possible to have a stricture of the ureter due to localized infection of another character.

Regarding the dilated ureter without stricture, before the days of pyelography, I operated on a young man 25 or 26 years of age, who had very definite attacks of renal colic, and not being able to find anything in the kidney I examined the ureter and did find a greatly dilated ureter. I opened the ureter and passed quite a large rubber catheter down into the bladder and demonstrated the fact that he had no stricture. I wonder whether that conforms to the type Dr. Braasch spoke of as atony.

Dr. Gilbert Thomas: I have been tremendously interested in ureteral stricture. All urologists have to be interested in this subject whether they want to or not because it is being discussed so frequently in the literature. About two years ago I decided to try to find out how often ureteral stricture exists and if I could make a diagnosis when it did exist. First we tried wax bulbs during a great many examinations of both males and females. We did not get very far because the majority of patients had some "hang" with the bulb, which upon further examination did not prove to be a stricture. We did not accomplish much with this clinical examination, so that I tried to get some postmortem material. With the help of the Department of Pathology of the University of Minnesota, I was permitted to examine material from about 200 autopsies. Most of the autopsy material is drawn from the Twin Cities or the near neighborhood, so that I was sure, if I missed the diagnosis of stricture during the clinical examination, that a reasonable percentage should appear in the autopsy findings. I examined both kidneys, both ureters, and that section of the bladder where the ureters empty into it. As soon as possible following the autopsy I used wax bulbs and measured the ureteral diameter, and in only one instance did we find a ureteral stricture and that was unilateral. In addition to passing wax bulbs and measuring the ureter, pyelo-ureterograms were made in every instance.

Recently I saw a postmortem specimen at the University Hospital which had dilated ureters on both sides. I am of the opinion that this is a congenital affair. The bladder section of the ureter in this case was not obstructed or narrowed so that there was no mechanical reason for the large ureters.

It is rather difficult, when reading a pyelogram, to tell whether or not the ureter is dilated. I think that when a stricture is present one should always be able to demonstrate dilatation above.

If one introduces novocain into the ureter, one can frequently, by repeating the pyelogram, show that the supposed stricture was nothing more than spasm. This indicates to me that spasm accounts for the largest number of so-called strictures.

I would like Dr. Braasch to mention, in closing his discussion, any reason for the widening of the ureter that is so frequently seen just as the ureter enters the pelvis. This occurs in normal ureters very frequently.

Dr. F. R. Wright: My experience in this line of work has been decidedly limited. I had one peculiar experience: a woman who complained of pain in her left side. When I passed a catheter into her ureter the pain disappeared and has not returned. Her urine at all times was normal. I cannot conceive that this was due to stricture. The ureter is a very narrow organ. One stretching by passing a catheter will not cure or remove a stricture. If we pass a filiform bougie through a narrow stricture in the urethra the mucous membrane will swell and the patient may have an increased trouble for 24 or 48 hours. The men who report these ureteral strictures never report any later trouble. The patient is always relieved from pain. I do not believe it is due to stricture. It must be a spasm. It is barely possible that the passage of the bulb into the ureter can produce a spasm which can be felt. There is no reason to suppose that the catheter may not produce spasm the same as a bulb.

Dr. H. L. Ulrich: I would like to ask Dr. Braasch about the intrinsic nerves of the ureters. The heart and the intestines all have intrinsic nerves which are connected with the spinal nervous system. Are the ureters connected to the splanchnic nerve in the pelvis? Is there not some central control?

DR. BRAASCH (in closing): I am going to answer the last question first. It is well known that the heart, when removed from the body, will continue to beat for a long time; and, similarly, the ureter has an intrinsic nervous mechanism which has no relation to the central system. Dr. Colvin's question is answered by the fact that neither he nor any other pathologist has ever observed a pathological condition in the ureter which would correspond to Dr. Hunner's stricture. Several years ago I asked our Dr. Robertson to be on the lookout for this type of stricture and if he ever found one to call me at once, but he has not done so yet. The weakness of Dr. Hunner's stricture theory is that no pathologist has ever demonstrated the condition that he described clinically. Therefore one cannot help but think that the cause of the so-called "hang" is a spasmodic condition of the ureter and not actual constriction. On the other hand, it may be difficult to demonstrate actual spasm of the ureter. I am sorry that there are not some of the adherents of Dr. Hunner's theories here to defend him. They could demonstrate, to their own satisfaction at least, that there was a stricture present.

As a result of the stricture theory, hundreds of patients are being treated for stricture who, I fear, have none. It is open to question whether many of them would not have just as much relief from massage, diathermy, or psychological treatment.

I am unable to explain the fusiform dilatation of the ureter in its pelvic portion, which Dr. Thomas asked about. The last word has not been said on this subject and I hope that my remarks will stimulate to farther investigation of the cause of this condition.

---

The meeting adjourned.

JOHN E. HYNES, M.D.,
Secretary.

# CASE REPORTS

Members are requested to report interesting and unusual cases for publication in this department. Many cases reported at hospital staff meetings and similar meetings are very instructive and worthy of publication.

## PULMONARY ACTINOMYCOSIS

### REPORT OF A CASE

WILLIS S. LEMON, M.D.
Division of Medicine, Mayo Clinic
*Rochester, Minnesota*

A Bohemian, aged forty-six years, coming from Montana, presented himself at the Mayo Clinic for examination February 10, 1925. He complained particularly of discharging abscesses of the chest wall. The history of the illness began with acute symptoms which necessitated drainage for empyema in July, 1924. The onset had been sudden and characterized by severe pain in the right side of the chest accentuated by inspiration. The illness was so severe that it was necessary for him to be sent to the hospital and to have morphin administered for the pain. During the early days of his illness, there was some uncertainty with regard to the degree of fever, although the patient is sure that he had some elevation of temperature. However, there was no complaint of cough, and within eight days his recovery seemed to be complete. Within a few days subsequent to his dismissal, however, he felt ill; his temperature varied from 100 to 102°, and cough appeared. At first the cough was dry and irritating in character, but it soon became productive of mucopurulent sputum stained occasionally by small amounts of blood. Suddenly during this illness he coughed up as much as 250 c.c. of pus at one time. He was again sent to the hospital and, after five days, empyema was diagnosed and an operation for drainage performed. He was kept in the hospital for seven weeks, but finally recovered satisfactorily, although the drainage from the wound had not completely ceased. The temperature, however, was normal; he gained weight satisfactorily, and the discharge was so slight that the wound required dressings only twice a day. Because of the chronicity of the discharge, the wound was probed with instruments and almost immediately afterward he began to fail in health. Fever appeared and he suffered from loss of strength and weight. A large abscess formed under the right arm which required incision and drainage during the latter part of November. Finally, there were four draining sinuses, scattered over the right side of the chest; in December the cough was productive of at least 125 c.c. of pus daily. Bismuth paste was injected each day for a month, but at every injection the cough became severe and paroxysmal, and was productive of not only pus, but of the injected material. Because of the immediate production of cough and the expectoration of bismuth, it would seem that the fistula leading to the bronchus must have been a short and straight one rather than a long and tortuous channel.

At the time the patient appeared at the clinic, he had a large subcutaneous abscess of the right upper portion of the front of the chest, the center of which was in the midclavicular line. Four sinuses were seen high in the axilla and toward the back near the angle of the scapula. The whole side was immobile with marked dullness on percussion posteriorly. The temperature was 100.4°, pulse 108, and blood pressure 102 systolic and 80 diastolic. The weight was 163 pounds, which represented a loss of 22 pounds.

The primary diagnosis was chronic empyema, with multiple fistulas and empyema necessitatis. Bronchial fistulas were known to be present from the history, and the condition was thought to be due to tuberculosis or actinomycosis, but malignant disease of the lung and pleura was considered as a possibility. Empyema necessitatis was considered possible because of the situation of the abscess. It has been observed that, when empyema ruptures through the chest wall, it does so at the point where the wall is thinnest, namely, in the midclavicular line or in the axillary region. After the patient's admission to the hospital, a diagnosis of actinomycosis was made by the recognition of sulphur bodies in the drainage material. During his stay in the hospital, his temperature varied from normal to 99.5°, and when his condition became satisfactory, the abscesses were incised and drained, and the sinuses curet-

ted. The diagnosis was confirmed at the time of operation. The large subcutaneous abscess contained from 240 to 300 c.c. of thick yellow pus in which sulphur bodies were plentiful. The primary reaction to operation was fairly satisfactory, although the temperature rose to 101.3°. It gradually fell for the next three days and then became normal. The pulse varied from normal to 110, and then after a few days reached an average of 80. His respirations varied from 20 to 24. He remained in the hospital until March 24, when he was dismissed on treatment, consisting of the administration of a saturated solution of potassium iodid which was started at a very low dosage of 10 grains three times a day. The daily dosage was increased, however, by 3 minims. Tonics and Blaud's pills were used because of the appearance of secondary anemia. Five radium treatments were given, a total of 5,700 mg.-hours. These were supplemented by a course of roentgenologic treatment anteroposteriorly. Morphin and codein were used when necessary to control the pain. During the patient's stay in the hospital, the hemoglobin was reduced to 40 per cent; the erythrocytes numbered 3,360,000, and the leukocytes averaged from 10,000 to 12,000, a rather low figure in this disease when the viscera are involved. The sputum was markedly reduced by treatment, so that only 60 c.c. was expectorated daily, but Actinomyces was found in the sputum.

From the time of the patient's dismissal until his readmission, contact was maintained through correspondence. While he was at home, he took large doses of potassium iodid. He had been informed that he should discontinue the treatment should gastric symptoms occur, and that further irradiation should be undertaken after three months. Within a month following dismissal, he was suffering so severely from pains in the chest that he was again admitted to the hospital, the pain becoming so severe as to call for morphin daily for the next three months. During this time, he lost the use of his right arm as a result of pain and contracture due to scarring from the incision of the abscesses in the axilla. In October, 1925, he was treated elsewhere, and it was found necessary to give further roentgenologic treatments and to reoperate for the improvement of drainage. All the wounds closed except the large subcutaneous abscess that had been opened at the clinic and the patient returned again to normal health.

As is characteristic of actinomycosis, however, there was recurrence of infection initiated by severe chills, pain, and increased drainage from reopening the sinuses. The discharge was similar to that of the early part of the illness, except that it had become less purulent and more watery in character, although it still remained blood-tinged. In November, he was taking 160 minims of potassium iodid solution each day.

The patient was readmitted to the clinic December 19. At this time the blood pressure was 103 systolic and 64 diastolic, the pulse 116, and the temperature normal. Many sinuses were found on the chest wall which drained serosanguineous and purulent material. Breath sounds could be obtained on the right side only, over the upper half of the lung, and fibrosis was evidenced by the displacement of the heart to the affected side. The chronicity of the suppurative disease of the lung was shown by marked clubbing of the fingers. He was unable to lift the right arm from the body on account of axillary scarring. Again the discharge contained sulphur bodies, and they could be obtained from the sputum as well, although they had not been present in the sputum for six months previously. The hemoglobin was 75 per cent; the erythrocytes numbered 4,080,000, and the leukocytes 7,200. Dense consolidation of the lower right lobe with marked fibrosis became apparent in the skiagram. Incision of the abscesses was again undertaken to provide better drainage of subcutaneous pockets that were being improperly drained through various communicating sinuses. Radium was again used on four occasions to a total of 1,200 mg.-hours.

## DISCUSSION

Actinomycosis as a disease in man has been recognized for nearly fifty years, but has always been considered to be a very rare infection. At the Mayo Clinic, on the contrary, there are records of 160 cases, of which New, in 1923, reported 107 affecting the head and neck. New and Figi reported cases affecting the tongue alone, while Brogden reported twenty-two affecting the abdomen, and Moersch reported three affecting the central nervous system. In 1923, Sanford and Voelker attempted to collect records of all the cases that had appeared within the United States. They were able to study the records of 700 cases. From this report, it appears that actinomycosis is distributed throughout the United States, but that the states in the upper Mississippi Valley and in the northwestern portion of the United States produce the largest percentage of cases. Owing to the careful registration in a number of eastern states, however, Massachusetts leads in the number reported; New York is second, Illinois third, Minnesota fourth, Wisconsin fifth, Iowa sixth, South Dakota seventh, and Montana eighth.

*The nature and site of the disease.*—The infection has been noted in almost all areas of the body, including the tongue, head and neck, bronchus, esophagus, mediastinum, chest wall, lung, diaphragm, central nervous system, abdomen, appendix, duodenum, liver, ovaries and extremities. In the Mayo Clinic the disease has not been seen in the lacrymal ducts, as described by Poncet and Bérard.

*Age and sex.*—Males predominated, and in the complete series, as described by Sanford, they were 80 per cent of the total number. Most of the patients were between twenty and forty years, although the patient whose case I have reported was forty-six years of age. There are records of cases in the two extremes of life and one instance of a child aged only twenty-eight days who was found at necropsy to have an abscess of the lung in which Actinomyces was discovered. In one case reported by Ahrens the patient was eighty-two years old and finally died from actinomycosis of the chest after an illness of ten years.

*Duration.*—Two types of infection have been noted in the Mayo Clinic: acute and chronic, the former lasting only a few months and the latter continuing for many years. In one case reported by Vinson and Sutherland, in which there were multiple areas of infection, one of which had produced a bronchoesophageal fistula, the disease had lasted twenty-eight years. Two other cases of the disease were observed which affected mainly the framework of the

body and subcutaneous tissues, in which the duration had been ten and fifteen years, respectively. All three of these patients are still in fairly good health.

*Route of infection.*—The thoracic type of case, such as reported here, constitutes about 14 or 15 per cent of all infections with actinomycosis. This percentage is fairly uniform and accords with the experience of various authors. From 60 to 70 per cent of the infections are in the head and neck. In 1925, Torek reported a similar instance of disease affecting the lung and chest in a man forty-two years old. He raised a question as to the cause of the infection in the lung and thought that the disease might be primary there. He admitted that the lung might be infected secondarily to the disease within the neck, from which location it might extend along the great vessels to the skull, meninges and brain, or downward along the spinal column in the shape of a perivertebral phlegmon causing caries of the vertebræ, suppuration of the costovertebral joints, and extension through the posterior mediastinum to the pleura and lung. I have, however, never seen the disease affecting bone. Torek finally came to the conclusion in his own case that the disease was primary in the lung with multiple foci of granulation tissue which broke down into abscesses. Some of these abscesses perforated into the bronchi causing hemoptysis; others perforated the pleura at the apex forming an abscess of the neck, while still others involved the pleura, breaking through it. When actinomycosis is primary in the lung it makes steady progress through the organ, without respect of tissue, invades the pleura, and causes adhesions so that, before penetrating the chest wall, the focus of empyema itself almost invariably covers a small area and contains only a small amount of purulent material. In the case reported here the bronchi had been invaded and a bronchial fistula established.

*Prognosis.*—The prognosis when the disease attacks the internal organs is not favorable even though the course may be a very chronic one. Patients usually succumb to exhaustion due partly to drainage and partly, perhaps, to amyloid degeneration of other organs. The patient under discussion has improved greatly, but is far from being well, and the disease may recur in the future. Treatment consists in the use of large doses of potassium iodid and the employment of irradiation with roentgen rays and radium.

## CHOREA OF PREGNANCY*

### REPORT OF CASE

MARTIN S. SICHEL, M.D.
*Minneapolis*

A. F., aged 27, married, primipara, was first seen when admitted to the Minneapolis General Hospital on September 26, 1925. She had had scarlet fever six years before and one attack of chorea three years ago lasting three weeks, from which she fully recovered. Until a few days prior to her admission her health had otherwise been good.

Her menstruation had always been normal; she last menstruated in March, 1925. Five days prior to admission, the patient began to be very irritable and nervous; this was followed by the development of choreiform movements mainly on the left side involving both the upper and lower extremities, convulsive opening and closing of the mouth, and a nervous irritability characterized by quick emotional changes such as crying and fear.

Physical examination showed a well nourished young woman, weight 140 pounds. The eyes showed a constant nystagmus and the pupils reacted to light and accommodation. The mouth showed a constant twitching; teeth were fairly good; tonsils were enlarged and seemed a possible focus of infection. The neck was negative. The heart and lungs were essentially negative, there being no indication of any cardiac valvular disease or damage to the heart from her previous illnesses. The abdomen showed an enlargement of the uterus reaching to one finger above the umbilicus. It was estimated that at this time the patient was about six months pregnant. Vaginal examination was negative except to further bear out the fact of the pregnant condition. The left leg and left arm were the seat of constant choreiform movements and twitchings. The reflexes were all slightly increased, but equal on both sides, and no pathological reflexes were present.

On admission the temperature was 98 F., the pulse 90, the respirations 20, and the blood pressure was 125/85. The urine was normal. The blood picture showed: hemoglobin, 80 per cent; red blood cells, 5,200,000; white blood cells, 14,600; polymorphonuclears, 85 per cent; lymphocytes, 14 per cent, and large mononuclears, 1 per cent.

The Wassermann test was negative; vaginal smears were negative; the blood culture was negative; and the blood chemistry was normal. A diagnosis of chorea of the Sydenham type complicating pregnancy was made.

During the first week she was kept in bed and given bromides, chloral, luminal, morphine, hyoscin, and Fowler's solution, but the course was a steady downhill one with the patient gradually reaching a maniacal stage necessitating restraints. The temperature remained normal and the pulse varied between 100 and 120. She was very easily irritated and refused to co-operate. It became necessary to feed her.

At this time the possible induction of premature labor was considered in order to save the patient's life, but before resorting to this it was thought advisable to try the intravenous injection of blood serum obtained from a normal pregnant woman. Accordingly, 15 c.c. of blood serum was given intravenously on four successive days. This was followed almost immediately by a marked improvement so that the restraints could be removed and the patient became rational and was able to take nourishment. Two weeks later she was again given 20 c.c. of blood serum on four successive days, this time followed by very marked improvement clinically. She remained in the hospital eight weeks in all, being discharged on November 21, 1925, with practically no signs of any muscular twitching and no apparent mental defect. The splendid result obtained in this case was attributed entirely to the intravenous use of the blood serum.

She was then followed in the out-patient department, returning to the hospital on December 31, 1925, in labor.

*From the Obstetric and Gynecological Service, Division B, of the Minneapolis General Hospital.

A normal labor ensued, ending in the spontaneous delivery of a healthy, normal, full term female child weighing 7 pounds 10 ounces. The patient remained in the hospital ten days, where she went through a normal postpartum period, the mother and baby both being discharged in good condition.

# PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

## SURGERY

SUPERVISORS:
DONALD K. BACON,
LOWRY BLDG., ST. PAUL
VERNE C. HUNT,
MAYO CLINIC, ROCHESTER

**EXPERIMENTAL NEPHROTOMIES:** Wm. James Carson (S. G. & O., 1926, 42; 1, p. 53). Moore and Corbett studied experimentally the damage done to the kidney by operation. They concluded, in part, that (1) an operation on the kidney always destroys a certain amount of kidney substance, the section itself doing less harm than the sutures; (2) the destruction of the kidney extends far beyond the site of the operation and can be demonstrated histologically. Magoun showed reduced function in 14 out of 26 experimental nephrotomies.

The author's experiments were undertaken in an effort to secure a method of suturing that would result in a minimal of kidney damage.

*Method of Experimentation:* Dogs were used. The kidney was delivered and incised from pole to pole down to the pelvis in the midline. The bleeding surfaces were sponged, approximated and held together by light pressure, while interrupted Cushing sutures were introduced into the capsule, without injuring the kidney substance.

*Results:* In 24 out of 25 dogs no blood was noted in the urine after 4 days; hemorrhage occurred in one instance. Examination of these kidneys after from 4 to 266 days showed the maximal width of the scar to be 4 mm., and histologically there was a minimum destruction of the kidney substance.

H. E. Simon, M.D.

**WHY DOES NOT THE THORACIC SURGEON CURE CANCER OF THE ESOPHAGUS?** Chevalier Jackson (Archives of Surgery, 1926, 12, p. 236). Cancer of the esophagus is exceeded in frequency only by uterine, mammary and gastric cancer. It is a mild, slow, and for a long time purely local process,—ideal conditions for surgical cure, yet little progress has been made toward this end.

The author blames the lack of early diagnoses largely on the fact that the diagnostic criteria taught in our text books are symptoms and signs resulting from obstruction and necessarily appearing very late in the disease. The blind passage of a bougie is only an inferential method at best and is negative in all except late cases.

An early diagnosis of cancer in the esophagus can be made with the same degree of certainty as on the cervix. There are only two methods by which the diagnosis can be made early and positively:

(1) *X*-ray, which is rarely erroneous in the hands of an experienced roentgenologist.

(2) Esophagoscopy, while a highly technical procedure, permits of very early diagnosis and makes possible the taking of tissue for microscopical examination.

There is good reason for believing that when the day shall have arrived when every patient with supposed "globus hystericus" or with the slightest subjective abnormality in swallowing is promptly examined with the esophagoscope, the thoracic surgeon will show a good percentage of cures.

H. E. Simon, M.D.

## ROENTGENOLOGY

SUPERVISORS:
LEO G. RIGLER,
MPLS. GEN'L HOSPITAL, MINNEAPOLIS
A. U. DESJARDINS,
MAYO CLINIC, ROCHESTER

**THE CLINICAL AND ROENTGEN DIAGNOSIS OF DUODENO-COLONIC FISTULA:** Kohlmann (Fort. a. d. Geb. d. Röntgen., V. 33, p. 554, June, 1925). Both duodeno-colonic and gastro-colonic fistulæ are relatively rare. They can be readily recognized roentgenologically by the rapid passage of the barium meal from the duodenum or stomach into the colon. A portion of the meal may then pass into the small intestine. Occasionally a residue of barium will be found in the stomach at the 24-hour examination due to regurgitation from the colon into the stomach through the fistula.

Gastro-colic fistulæ usually occur between the greater curvature and the ascending portion of the splenic flexure. In duodeno-colic fistulæ the stomach can usually be well made out as normal, while the fistula passes into the proximal portion of the colon.

Large, fatty stools and absence of trypsin can occur in this condition, so that they are not pathognomonic of pancreatic carcinoma. Disturbances of liver and pancreatic function may occur later as secondary phenomena. These are due presumably to ascending infection passing into the duodenum from the large bowel.

The author reports a case of fistula between the duodenum and the transverse colon due to an ulcerating carcinoma.

Leo G. Rigler, M.D.

## EYE, EAR, NOSE AND THROAT

SUPERVISORS:
VIRGIL J. SCHWARTZ,
PHYS. & SURG. BLDG., MINNEAPOLIS
E. L. ARMSTRONG,
FIDELITY BLDG., DULUTH

HEAD PAINS OF OCULAR ORIGIN: Roderic O'Connor, M.D. (San Francisco. California and Western Medicine, Sept., 1925). It may be estimated that seventy per cent of all headaches are due to ocular disturbances. Ordinary eye examination may reveal nothing wrong, but more careful study will show latent errors of the extra-ocular muscles or a glaucoma. Early morning headaches are usually of nasal origin, while those brought on by riding in street- or motor-cars are most often found to be due to extraocular muscle trouble, compensation for which is more difficult when the eyes follow moving objects.

Basal, occipital and cervical pains may be due to changes in head position to compensate oblique astigmatism, vertical deviations, cyclophoria, or muscle paralyses.

Headache is a pain felt in the dural terminals of the trigeminus, of the upper cervicals, and of the vagus—especially the first. The centers of the third, fourth, fifth, sixth and seventh nerves are closely related and connected; the fifth is the nerve of sensation to the areas which the others supply as motor nerves, three of these innervating the eye muscles. We thus have a reflex arc. Communications from the ophthalmic division to the oculo-motor nerves are for ordinary sensation in the ocular muscles. Reflex ocular headaches may be due, therefore, to (a) overwork of the oculo-motor centers, with irritation of the fifth center by contiguity, (b) peripheral irritation of the sensory terminals in the muscles due to overactivity or to fatigue toxins. No matter how the fifth center is irritated, this is projected out to its dural terminals and is referred to as headache.

Glaucoma and some acute inflammations of the eye may cause headache; but there are several more frequent causes.

I. Pupillary asthenopia is the overstimulation, by a glaring sun- or artificial-light, of the mechanism which constricts the pupil. Refractive or muscle errors can often be found and corrected so as to render tinted glasses unnecessary.

II. Refractive errors.

1. Hyperopia is a condition wherein the accommodation is at work for distance as well as for near work; that is, the ciliary muscle is always at work when the eye is open.

2. Astigmatism causes much difficulty, especially when oblique, for the distortion thus caused must be compensated through rotation of the eye about an antero-posterior axis by the oblique muscles, or through head-tilting, or both together.

3. Anisometropia is a condition in which there is such a great difference of refraction in the two eyes as to preclude binocular single vision.

4. Presbyopia often causes trouble because of the overwork of the ciliary muscle, in trying to enable the hardening lens to change its focus.

III. Disturbances of the Extra-Ocular Muscles. Strabismus and paralysis are here excluded.

1. Esophoria presents visual axes which tend to converge, so that the corrective effort falls on the muscles of divergence, which normally have but little such work to do. The strain may be severe.

2. Exophoria shows visual axes which tend to diverge, so that the correction falls upon the muscles of convergence, which are used to this work, so that there is much less strain than in esophoria.

3. Cyclophoria shows a vertical axis which tilts in or out, calling for correction by the oblique muscles.

4. Hyperphoria presents the visual axis of one eye higher than that of the other, and causes symptoms of a severity out of all proportion to the degree of error. One eye must turn up while the other turns down. A head-tilt and a drooping shoulder, to bring the eyes to a level, may be present; often there is elevation of one eyebrow, through associated action of the frontalis in an effort to bring the lower eye up.

5. Insufficiency of convergence is a condition wherein the visual axes cannot be converged close enough to allow protracted use of the eyes *at reading distance*, i. e., thirteen inches. Often these cases show normal balance for distance.

*Treatment*

A. Glaucoma—miotics or operation.
B. Refractive errors—lenses.
C. Muscle imbalances:
   1. Non-operative measures, as lenses, with muscle exercises and, when needed, prisms.
   2. Operative measures:
      a. Tenotomies.
      b. Shortenings.

VIRGIL J. SCHWARTZ.

---

OPHTHALMIC SIGNS IN COMMON NERVOUS DISEASES: W. Fletcher Stiell (Practitioner (London), Sept., 1925).

I. Migraine, often considered a functional disorder, is more likely the result of an angio-neurotic disturbance of the circulation of the sensory cerebral cortex, just as epilepsy is due to a similar disturbance in the motor cerebral cortex. Migraine usually occurs in persons with periodic, transitory visual impairment, such as hemianopia or scotomata, associated with a refractive error, most commonly myopic astigmatism. A heterophoria is occasionally present, and the fundus is normal. Correction of the refractive error and the muscular imbalance, together with the elimination of excessive mental and physical strain, will often effect a cure.

II. Epilepsy presents no diagnostic eye signs, yet some are of interest. Well-known visual aura precede the seizure, while during the latter there is a fibrillary twitching of the closed lids, followed by rapid opening and closing of the lids. The pupils are dilated and the conjunctival reflex is absent. Between seizures there is a characteristic wandering of the eyes, or a fixation upon some unimportant object, —that is, a loss of visual concentration.

Jacksonian epilepsy may present optic neuritis or post-

neuritic atrophy, due to pressure of the tumor or other condition causing the disease.

III. Disseminated sclerosis frequently presents a relative or an absolute central scotoma. Peripherally, also, the field may be defective, and transitory blindness occurs. Normal fundi or those with slight optic atrophy are seen. Retrobulbar neuritis is often found, and is evidenced by poor vision, pain on moving the eyeballs and pain on pressing them back into the orbits. True nystagmus is present in fully half the cases.

IV. Tabes dorsalis shows characteristic eye signs. The pupils are usually greatly contracted, but may be unequal, and are often of the Argyll-Robertson type. This latter condition, together with a primary optic atrophy, may precede the spinal signs of tabes by several years.

V. General paralysis of the insane presents pupils which are at first contracted, later dilated, often unequal and with a poor light reaction in the wider one.

VI. Encephalitis lethargica may show eye signs which are not at all proportionate in degree with the severity of the disease. The symptoms are (1) diplopia, from paralysis of the extrinsic muscles; (2) visual impairment, due to organic nerve changes or paresis of accommodation; (3) difficulty in keeping the eyes open, due to ptosis. The signs are (1) partly open eyes, which can by effort be fully opened, but only for a short time; (2) slight hyperemia of the conjunctiva; (3) a dull, dry cornea, with diminished reflex; (4) equal pupils which react sluggishly to light; (5) a slow, aimless side-to-side movement of the eyeballs; (6) optic neuritis, which may disappear or may progress to atrophy and blindness.

VII. Neurasthenia and hysteria can not be differentiated by eye signs alone. Persons between ten and thirty years of age, who have asthenopia, yet do not engage in excessive ocular work and have a refractive error of less than two diopters, are considered ocular neurasthenics. Persons who complain of asthenopia, without excessive eye work, with no refractive error at all and with normal muscle balance, are considered hysterical. Those who have, in addition, a full range of accommodation, are probably malingerers. At the trial case, the neurasthenic tries to attain 20/20 vision, something which the hysteric rarely attempts. A patient who is amblyopic in one or both eyes, with a concentric contraction of the field, yet with a normal fundus and no evidences of glaucoma, probably has nervous amblyopia. This conclusion is further substantiated by the finding of a spiral visual field of ocular fatigue.

Almost every eye symptom, and even many signs, may be found in the hysterical patient, among them being amaurosis, ptosis, blepharospasm, lacrymation, photophobia, squint, nystagmoid movements, and conjugate deviation of the head and eyes.

VIRGIL J. SCHWARTZ.